DOCUMENT RESUME

ED 270 502 TM 860 392

AUTHOR Massey, Romeo M.
TITLE The Relevant Education for Agriculture and Production (REAP) Nine-Year Evaluation: Implications for Development Education.
PUB DATE Apr 86
NOTE 180p.; Paper presented at the Annual Meeting of the American Educational Research Association (70th, San Francisco, CA, April 16-20, 1986).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC08 Plus Postage.
DESCRIPTORS Academic Achievement; *Agricultural Skills; Comparative Analysis; Developing Nations; Foreign Countries; *Formative Evaluation; Grade 8; Junior High Schools; Longitudinal Studies; Models; Multiple Regression Analysis; *Program Evaluation; *Program Implementation; Questionnaires; *Rural Schools; Scores; Skill Development
IDENTIFIERS *Belize; *Relevant Education for Agriculture and Production

ABSTRACT

Belize's Relevant Education for Agriculture and Production (REAP) national primary school program is described in data from seven annual formative evaluations (1979-1985). The 1984-85 program/school evaluation included 54 rural REAP schools and utilized a 43-item questionnaire containing eight quality sub-variables. The quality of REAP schools varied greatly and showed generally successful but incomplete implementation. Academic achievement of all rural Standard VI (eighth grade) students on the 1984-85 Belize National Selection Examinations (BNSEs) was analyzed. Over seven years, no significant differences were found between REAP and non-REAP students on 15 BNSEs; REAP students scored significantly higher on 10 other BNSEs and never scored significantly lower on any of the 25 tests. REAP students produced substantial amounts of agricultural products in seven years. Participation in REAP did not lower BNSE scores below those of non-REAP students and probably taught useful rural-oriented knowledge and skills. REAP was compared to four development models and two educational models illustrating REAP's eclectic and pragmatic, rather than dogmatic orientation. Maintaining academic achievement and learning practically-oriented knowledge and skills were not incompatible in Belize's new national approach to primary school education. Seventy-five tables are contained in the report. Appendices include the REAP format of statements for program evaluation, the 1984-1985 REAP program/school questionnaire, and an outline of the REAP learning activity pack. (Author/LR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED270502

THE RELEVANT EDUCATION FOR AGRICULTURE AND PRODUCTION (REAP) NINE-YEAR EVALUATION: IMPLICATIONS FOR DEVELOPMENT EDUCATION

Romeo M. Massey

Center for Instructional Development and Services

Florida State University

and

C A R E

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

R. M. Massey

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Presented at the Annual Meeting of the

American Educational Research Association

San Francisco, California

April, 1986

TM 860 392

CONTENTS

I. Table of Contents.....i-iii

II. List of Figures.....iv

III. List of Tables.....v-ix

IV. Abstract.....x

V. Acknowledgements.....xi

1.0 Preface.....1-8

1.1 Purpose of the Formative Evaluation.....1-2

1.2 Scope of the 1984-85 and Nine-Year Formative Evaluations.....3-6

1.3 Implementation of the 1984-85 and Nine-Year Formative Evaluations.....6-7

1.4 Limitations of the 1984-85 and Nine-Year Formative Evaluations.....7-8

2.0 Perspectives.....8-20

2.1 Overview of Belize.....8-11

2.2 Overview of Belizean Primary Education.....11-15

2.3 Overview of the REAP Program.....15-20

2.4 Overview of Evaluation Methodologies.....20

3.0 REAP Program/School Evaluation.....21-87

3.1 Overview of the Program/School Evaluation Methodology.....21-24

3.2 Overview of the REAP Program Administration.....25-27

3.3 REAP Program/School Evaluation Data Presentation and Analysis: Quality of REAP:

3.3.1 School-Level Administration.....27-32

3.3.2 Curriculum and Instructional Program.....33-43

3.3.3 Principals.....44-50

3.3.4 Teachers.....50-55

3.3.5 Inservice Training.....55-59

3.3.6 Agricultural Program.....60-70

3.3.7 Parent-Community Participation.....71-77

3.3.8 Impact on the Communities.....77-84

3.3.9 Overall School Program Quality.....84-85

3.3.10 Summaries of Eight School Quality Sub-Variables and Overall Quality.....86-87

4.0 Evaluation of Academic Student Achievement.....88-113

4.1 Purpose of the Academic Evaluation.....88

4.2 Overview of Methodology for Evaluating Academic Achivement.....88-90

4.3 Academic Achievement of REAP and NON-REAP Students.....90-97

4.4 Academic Achievement of REAP Students.....98-113

5.0 Evaluation of REAP-Related Student Achievement.....114-122

5.1 Proposed Methodology for Evaluating REAP-Related Student Achievement.....114

5.2 REAP Knowledge Test.....114-115

5.3 REAP Skills Tests.....115-116

5.4 REAP Agricultural Production.....117-122

6.0 Comparative Analysis of REAP.....122-129

6.1 Theories of Development.....122

6.1.1 Modernization Theory.....122-123

6.1.2 Human Capital Theory.....124-125

6.1.3 Liberation Theory.....125-126

6.1.4 Dependency Theory.....126-127

6.2 Educational Models.....128-129

7.0 Summary, Conclusions, and Implications.....130-140

8.0 Appendices.....141-153

Appendix-A REAP Format of Statements for Program Evaluation.....141

Appendix-B Belize and U.S. Primary Grade Equivalents.....142

Appendix-C 1984-85 REAP Program/School Questionnaire.....143-149

Appendix-D REAP Learning Activity Pack (REAP/LAP).....150-153

9.0 Reference Notes.....154

II. List of Figures

Figure 1: Preferred Model of Program Development.....2

Figure 2: REAP Model of Program Development.....2

Figure 3: REAP Organizational Structure.....26

III. List of Tables

Table 1: Rural Primary Schools in REAP During 1984-85 School Year, Initial Year In Program, Institutional Management, and Approximate Total Enrollment.....4-5

Table 2: Weighted Mean Percentages of Quality of REAP School Administration, by Category of Rater.....28

Table 3: Weighted Mean Percentages of Quality of REAP School Administration, by District.....29

Table 4: Average Raw Score, Care of REAP Tools and Equipment.....30

Table 5: Average Raw Score, Keeping Bank Accounts and Financial Records.....31

Table 6: Average Raw Score, Returning Reports.....31

Table 7: Average Raw Score, Coordinating or Participating in REAP Events.....32

Table 8: Pearson Product Correlations of Weighted Mean Percentages of Eight REAP School Program Quality Sub-Variables, With Overall School Quality Percentages.....32

Table 9: Weighted Mean Percentages of Quality of Use of Curricular and Instructional Program, by Rater Category.....34

Table 10: Weighted Mean Percentages of Quality of Use of Curricular and Instructional Program, by District.....34

Table 11: Average Raw Score, Use of Curriculum Guide and Yearly Plan.....36

Table 12: Average Raw Score, Use of Agricultural Manual.....37

Table 13. Average Raw Score, Use of Health and Nutrition Manual.....38

Table 14: Average Raw Score, Use of Other REAP Textbooks.....38

Table 15: Average Raw Score, Use of REAP Learning Activity Packs (REAP/LAPs).....40

Table 16: Average Raw Score, Use of Activity-Based Instruction.....41

Table 17: Average Raw Score, Use of Integrated Learning.....41

Table 18: Average Raw Score, Use of Skills Test and Competency-Based Criteria.....42

Table 19: Average Raw Score, Visits To/From Other REAP Schools.....43

Table 20: Weighted Mean Percentages of Quality of REAP Principals, by Rater Category.....45

Table 21: Weighted Mean Percentages of Quality of REAP Principals, by District.....45

Table 22: Average Raw Score, Principals' Attendance at Curriculum Inservice.....46

Table 23: Average Raw Score, Principals' Attendance at Belize School of Education.....47

Table 24: Average Raw Score, Principals' Attendance at Agricultural Inservice.....48

Table 25: Average Raw Score, Principals' Attendance at Health and Nutrition Inservice.....48

Table 26: Average Raw Score, Principals' Attendance at REAP District Council Meetings.....49

Table 27: Weighted Mean Percentages of Quality of REAP Teachers, by Rater Category.....51

Table 28: Weighted Mean Percentages of Quality of REAP Teachers, by District.....51

Table 29: Average Raw Score, Teachers' Attendance at Curriculum Inservice.....52

Table 30: Average Raw Score, Teachers' Attendance at Belize School of Education.....53

Table 31: Average Raw Score, Teachers' Attendance at Agricultural Inservice.....54

Table 32: Average Raw Score, Teachers' Attendance at Health and Nutrition Inservice.....54

Table 33: Weighted Mean Percentages of Quality of REAP Staff Inservice, by Rater Category.....56

Table 34: Weighted Mean Percentages of Quality of REAP Staff Inservice, by District.....57

Table 35: Weighted Mean Percentages of Quality of REAP Agricultural Program, by Rater Cateogry.....61

Table 36: Weighted Mean Percentages of Quality of REAP Agricultural Program, by District.....61

Table 37: Average Raw Score, Adequate Land.....62

Table 38: Average Raw Score, Adequate Garden Fence.....63

Table 39: Average Raw Score, Adequate Water.....63

Table 40: Average Raw Score, Maintenance of REAP Facilities.....64

Table 41: Average Raw Score, Keeping Agricultural Records.....65

Table 42: Average Raw Score, Vegetable and Other Crop Production.....66

Table 43: Average Raw Score, Poultry Production.....67

Table 44: Average Raw Score, Honey Production.....67

Table 45: Average Raw Score, Other Crops.....68

Table 46: Average Raw Score, Participation in Other Agricultural Events.....69

Table 47: Average Raw Score, School Leaver Projects.....70

Table 48: Weighted Mean Percentages of Quality of Parent-Community Participation in REAP, by Rater Category.....72

Table 49: Weighted Mean Percentages of Quality of Parent-Community Participation in REAP, by District.....72

Table 50: Average Raw Score, Community Knowledge about REAP.....73

Table 51: Average Raw Score, Community Attendance at REAP Events.....74

Table 52: Average Raw Score, Community Contributions to REAP.....75

Table 53: Average Raw Score, Special REAP Accomplishments.....76

Table 54: Weighted Mean Percentages of Quality of REAP Impact on Community, by Rater Category.....78

Table 55: Weighted Mean Percentages of Quality of REAP Impact on Community, by District.....79

Table 56: Average Raw Score, Increase in Home Gardens.....80

Table 57: Average Raw Score, Increase in Poultry Raising.....80

Table 58: Average Raw Score, Increase in Beekeeping.....81

Table 59: Average Raw Score, Increase in Nutritious Diets.....82

Table 60: Average Raw Score, Increase in Leadership by Principals and Teachers.....83

Table 61: Average Raw Score, Increase in Positive Attitudes About Agriculture.....83

Table 62: Weighted Mean Percentages of Overall Quality of REAP School Program, by Rater Category.....85

Table 63: Weighted Mean Percentages of Overall Quality of REAP School Program, by District.....85

Table 64: Weighted Mean Percentages of Eight Program Quality Sub-Variables and Overall Quality, by Rater Category.....87

Table 65: Weighted Mean Percentages of Eight Program Quality Sub-Variables and Overall Quality, by District.....87

Table 66: REAP and NON-REAP Students Included in Academic Evaluation, by District.....89

Table 67: Mean Scores of 771 REAP and 584 NON-REAP Students On 1984-85 Belize National Selection Examination (BNSE).....92

Table 68: Mean Scores of 502 REAP Students With Full Three-Year REAP Program and 584 NON-REAP Students On 1984-85 BNSE.....95

Table 69: Mean Scores of REAP and NON-REAP Students On BNSE Examinations, From 1979 Through 1985.....97

Table 70: Pearson Product Correlation Coefficients Between REAP Reading Comprehension and Four BNSE Tests.....98

Table 71: Mean Scores of REAP Students on 1984-85 BNSE Examinations, by District.....100

Table 72: Mean Scores of REAP Students on 1984-85 BNSE Examinations, by School Size.....102

Table 73: Mean Scores of REAP Students on 1984-85 BNSE Examinations, by Religious Denomination of School Management.....103

Table 74: Mean Scores of REAP Students on 1984-85 BNSE Examinations, by Sex.....105

Table 75: Mean Scores of REAP Students on 1984-85 BNSE Examinations, by Student's Primary Language.....106

Table 76: Mean Scores of REAP Students on 1984-85 BNSE Examinations, by Program Maturity.....108

Table 77: Summary of the Standard Regression Analysis On the 1984-85 Belize National Selection Examination Scores of 771 REAP Students, by Student-Related Variables.....111

Table 78: Summary of the Standard Regression Analysis On Fifty-Four School-Level Averages, of the 1984-85 Belize National Selection Examination Scores of REAP Students, by School-Related Variables.....112-113

Table 79: REAP Teacher Perceptions of REAP-Related Skills Mastered by 339 REAP Students.....116

Table 80: Agricultural Production at REAP Schools and Belize School of Education, 1984-85.....118

Table 81: Agricultural Production at REAP Schools and Belize School of Education, 1978-79, Through 1984-85.....120

Table 82: Average Yearly Agricultural Production at REAP Schools and Belize School of Education, 1978-79, Through 1984-85.....121

ABSTRACT

Belize's Relevant Education for Agriculture and Production (REAP) national primary school program was described in data from seven annual formative evaluations (1979-1985).

The 1984-85 program/school evaluation included 54 rural REAP schools and utilized a 43-item questionnaire containing eight quality sub-variables. The quality of REAP schools varied greatly and showed generally successful but incomplete implementation.

Academic achievement of all rural Standard VI (eighth grade) students on the 1984-85 Belize National Selection Examinations (BNSEs) was analyzed. Over seven years, no significant differences were found between REAP and non-REAP students on 15 BNSEs; REAP students scored significantly higher on 10 other BNSEs and never scored significantly lower on any of the 25 tests.

REAP students produced substantial amounts of agricultural products in seven years.

Participation in REAP did not lower BNSE scores below those of non-REAP students and probably taught useful rural-oriented knowledge and skills.

REAP was compared to four development models and two educational models illustrating REAP's eclectic and pragmatic, rather than dogmatic orientation.

Maintaining academic achievement and learning practically-oriented knowledge and skills were not incompatible in Belize's new national approach to primary school education.

ACKNOWLEDGEMENTS

The information and data presented in this study were compiled by Belizean principals, teachers, community members, Peace Corps Volunteers, Mr. David Eck, REAP Project Manager for the Ministry of Education, and CARE/Belize staff members Ms. Lee Debra Gelb, Mr. John Link, and Mr. Estelito Loria. My thanks to all for their extraordinary effort.

The use of the information and data was graciously made available by CARE, and the Director of the CARE mission in Belize, Mr. Harold Sillcox.

Additional thanks are due to my colleagues at the Center for Instructional Development and Services, Drs. Ora Kromhout and Marvin Patterson for their advice on statistical treatments, Dr. Carole Massey for her review of the paper, and to Mr. Kermit Rose, of the Computer Center's User Services Section, for his guidance through the labyrinthine syntax of the computer programs.

The opinions and conclusions expressed in this paper are the author's and do not necessarily represent those of the Center for Instructional Development and Services, Florida State University, CARE, or the Government of Belize.

1.0 PREFACE

1.1 Purpose of the Formative Evaluation

The purpose of formative evaluation is to provide program developers with empirically-based information and data which will assist them in determining where they are in the development process and which future directions they should follow. Summative evaluation is conducted after the program development and implementation are completed. It deals primarily with outcomes, rather than with ongoing developmental processes. The summative evaluation process is described in step number 7 of the Preferred Program Development Model shown in Figure 1, while the formative evaluation process is depicted in steps 1-6 of the same model.

If it had been feasible to use the Perferred Model of Program Development in REAP, each phase of the development process would have been completed with measurable outcomes evaluated before proceeding. It would have allowed for an orderly testing of processes and products before being fully implemented. The educational treatment would have been implemented before final hypotheses and conclusions were examined in a summative evaluation.

Political, logistical, and funding restraints made it impractical to use the Preferred Model. Instead, the REAP Program Development Model shown in Figure 2 was used. From its inception REAP was obliged to simultaneously develop, implement, and evaluate. In the past, REAP formative evaluations focused on development processes and only recently attempted to measure outcomes.

Figure 1: Preferred Model of Program Development

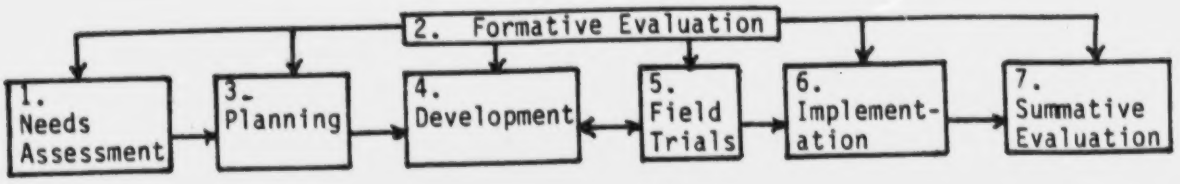
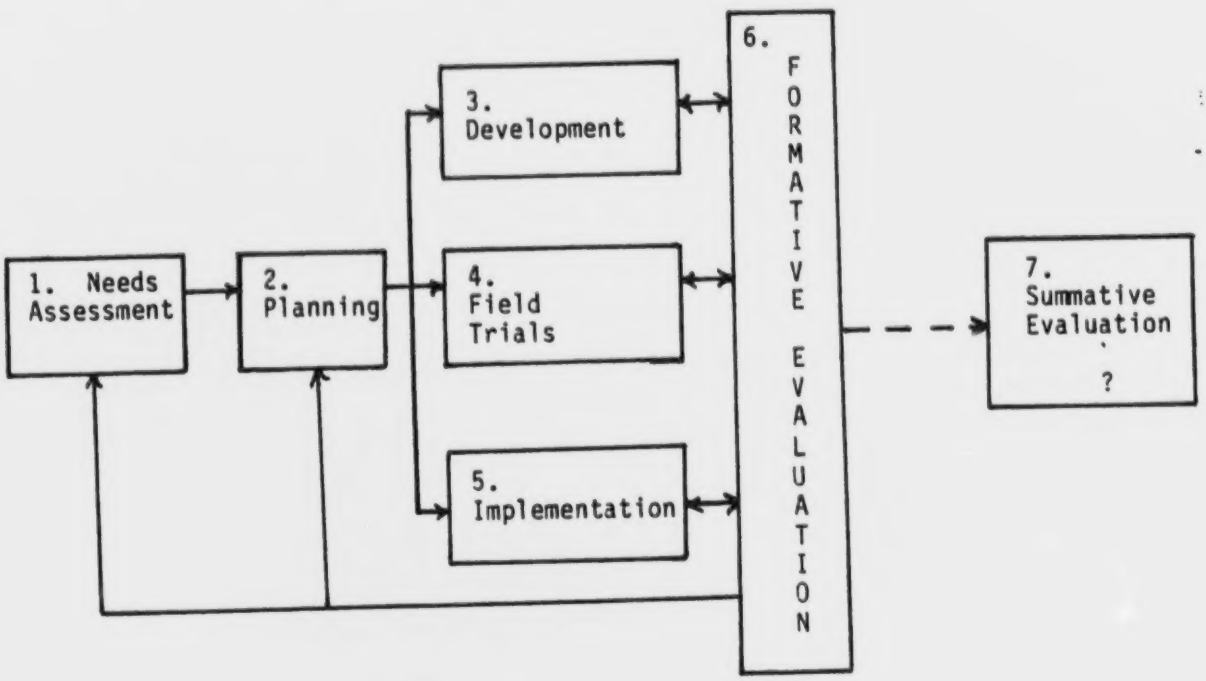


Figure 2: REAP Model of Program Development



1.2 Scope of the 1984-85 and Nine-Year Formative Evaluations

The Rural Education and Agriculture Program (REAP--later renamed Relevant Education for Agriculture and Production to include both urban and rural schools) was initiated by the Government of Belize (GOB), CARE/Belize (CARE), the U.S. Peace Corps, and Heifer Project International in July, 1976. A series of seven annual formative evaluations were conducted from 1979 to the present. Major concurrent evaluations took place after three years (1979), six years (1982), and nine years (1985).

The present formative evaluation was intended to cover three major aspects of REAP: 1) implementation in REAP program schools; 2) REAP students' performance on the Belize National Selection Examination (BNSE); 3) and REAP students' acquisition of REAP-oriented knowledge and skills not taught in the traditional curriculum.

During the 1984-85 school year there were 55 rural REAP schools with a total enrollment of approximately 8,931 students (see Table 1). This number represented approximately 37 percent of the 150 Belizean rural primary schools and 54 percent of the total number of students in those schools. Not all primary schools sent candidates to take the Belize National Selection Examination (BNSE). In the 1984-85 BNSE, 129 rural schools sent 1,355 students to take the examinations. Of these, 54 were rural REAP schools (which sent 771 candidates) and 75 were non-REAP rural schools (that sent 584 students). The entire population of 1,355 REAP and non-REAP students from rural schools who took the BNSE examinations were included in the analysis of academic achievement.

TABLE 1: Rural Primary Schools in REAP During The 1984-85 School Year, By District, Initial Year In Program, Institutional Management, and Approximate Total Enrollment

District	School Name	Initial Year in REAP	Management	Approx. Total No. of Students
Toledo	1. Little Flower	1976-77	R.C.*	186
	2. Forest Home	1976-77	Meth.*	114
	3. San Antonio	1979-80	R.C.	378
	4. San Pedro	1979-80	R.C.	224
	5. Laguna	1982-83	Gov't.*	69
	6. Pueblo Viejo	1982-83	R.C.	109
	7. Barranco	1983-84	R.C.	76
	8. Big Falls	1984-85	R.C.	221
Stann Creek	1. St. Matthews	1976-77	Ang.*	124
	2. Holy Angels	1976-77	R.C.	294
	3. Hopkins	1979-80	R.C.	282
	4. Sittee River	1982-83	Meth.	52
	5. Hope Creek	1982-83	Meth.	49
	6. Light-of-the-Valley	1982-83	Bapt.	50
	7. Independence	1983-84	R.C.	262
	8. Georgetown	1984-85	R.C.	68
Belize	1. Bermudian Landing	1976-77	R.C.	56
	2. Double Head Cabbage	1976-77	Ang.	85
	3. Rancho Dolores	1976-77	R.C.	95
	4. Lucky Strike	1979-80	Gov't.	120
	5. Maskall	1979-80	R.C.	207
	6. Zion Park	1982-83	Meth.	74
	7. Crooked Tree	1982-83	Gov't.	172
	8. Ladyville	1983-84	Gospel Miss.	186
	9. Hattieville	1983-84	Gov't.	213
	10. Gracie Rock	1983-84	Ang.	72

* Legend

R.C. = Roman Catholic
Meth. = Methodist
Ang. = Anglican
Gov't. = Government
Bapt. = Baptist
Gospel Miss. = Gospel Missionary

continued on next page

District	School Name	Initial Year in REAP	Management	Approx. Total No. of Students
Cayo	1. Bullet Tree Falls	1980-81	R.C.	240
	2. San Antonio	1980-81	R.C.	180
	3. Blackman Eddy	1980-81	R.C.	87
	4. St. Edmund Campion (Tea Kettle)	1982-83	R.C.	243
	5. Santa Familia	1982-83	R.C.	91
	6. Cristo Rey	1983-84	R.C.	91
	7. Augustine Pine Ridge	1983-84	R.C.	43
	8. Calla Creek	1984-85	R.C.	78
Orange Walk	1. Trinidad	1981-82	Gov't.	115
	2. San Lazaro	1981-82	R.C.	114
	3. San Jose	1981-82	Gov't.	288
	4. Yo Creek	1982-83	R.C.	227
	5. Chan Pine Ridge	1982-83	Gov't.	91
	6. San Antonio	1982-83	R.C.	72
	7. Guinea Grass	1983-84	R.C.	388
	8. San Pablo	1983-84	R.C.	233
	9. Douglas	1983-84	Gov't.	56
	10. August Pine Ridge	1983-84	R.C.	218
	11. San Felipe	1984-85	R.C.	187
Corozal	1. San Narciso	1981-82	R.C.	368
	2. Concepcion	1981-82	R.C.	175
	3. Libertad, ME	1981-82	Meth.	223
	4. Patchakan	1982-83	R.C.	190
	5. San Pedro	1982-83	Gov't.	63
	6. Chunox	1982-83	R.C.	141
	7. Caledonia	1983-84	R.C.	220
	8. Libertad, RC	1983-84	R.C.	205
	9. Santa Clara	1983-84	R.C.	240
	10. Louisville	1984-85	R.C.	116
		Approx. Total Students in 55 REAP Schools During 1984-85 School Year		8,931

All 54 rural REAP schools that sent students to the BNSE were included in the REAP School Evaluation. One rural REAP school was not included in either of the evaluations because of the lack of data. None of the five REAP schools in urban areas were included in the evaluation. One of these urban schools had a demonstration REAP program underway for two years, but was not comparable with the other REAP schools. The other four urban REAP schools did not initiate the REAP program until the latter part of the 1984-85 school year and were, therefore, excluded.

All Std. VI (Standard VI, or Eighth Grade) primary school students in the 54 REAP schools were included in the REAP knowledge and skills tests.

1.3 Implementation of the 1984-85 and Nine-Year Formative Evaluations

Preparations for the implementation of the nine-year formative evaluation began with presentation of the results of the six-year evaluation in January, 1983. Anticipating more measurable students outcomes and wanting broader participation than in previous years, the process of developing appropriate data-based measurement systems was begun by:

1.3.1 transforming the Statements for Program Evaluation (see format, Appendix-A) that had been the major criteria for previous evaluations, into a questionnaire.

1.3.2 preparing demonstration runs (for 2 years) of a computer-assisted analysis of variables which might affect BNSE student achievement.

1.3.3 developing competency-based test items of REAP knowledge and skills checklists based upon criteria stated in the curricular materials.

1.4 Limitations of the 1984-85 and Nine-Year Formative Evaluations

1.4.1 The major limitation on the 1984-85 formative evaluation is that REAP is still in a developmental phase. Some aspects of the educational "treatment," such as parts of the curriculum and inservice program, are not yet completed. Any "conclusions" must be viewed as observations made in a dynamic system and should not be assigned the same validity as they would receive in a more stable situation.

1.4.2 The tests of REAP knowledge and skills, as measured by a multiple choice (knowledge) test and competency-based (skills) checklists were not completed in time to allow valid and reliable data to be collected.

1.4.3 The enormous variability between schools in Belize, due in part to the ad hoc historical development of the school system (described later) produces many potentially confounding factors that were beyond the scope of the analysis in the present formative evaluation.

1.4.4 The author of this formative evaluation was affiliated with REAP as the CARE Curriculum/Program Consultant since October, 1977. Although the normal constraints used to avoid systematic bias were observed, this special relationship must be viewed as both a help and a potential hindrance in conducting a formative evaluation.

2.0 PERSPECTIVES

2.1 Overview of Belize

Belize (formerly British Honduras) has a great deal in common with the other former British Colonies and Latin American nations of the Caribeean and Central America, but it also has a unique set of geographical, historical, cultural, and economic characteristics which set it apart from its neighbors.

In size it is a relatively small country, the second smallest in Central America, approximately 174 miles in length and has a maximum width of about 68 miles (CARE, 1979). It also has a relatively small population of approximately 158,000 (Government of Belize, 1984), second only to French Guiana's miniscule population, among the nations bordering the Caribbean. This tiny population

gives it an average of approximately 18 people per square mile, a source of great potential, but also of envy and possible conflict from its more crowded neighbors. Forty-six percent of the population is 14 years old or under.

Although the Maya had made Belize a major food-producing area for their culture, neither the Spanish nor the English showed a great deal of interest in this region until the mid-17th century, when loggers began extracting the mahogany and other hardwoods which were so highly prized in Europe. British Honduras was declared a British Colony in 1862, gained self-governing status in 1964, and became the independent nation of Belize on September 21, 1981. A dispute with Guatemala concerning territorial claims delayed independence for two decades after most British colonies in the Caribbean had gained theirs. Belize has a centralized, bicameral, parliamentary, and democratic form of government patterned after Great Britian.

Culturally, Belize is more diverse than any of its neighbors. Although the national language is standard English and is widely used, Creoles (Afro-Belizeans, who comprise about 40 percent of the population) are most likely to speak the Creole English dialect as well. Approximately 25 percent of the population are Mestizos (of Hispanic and Indian decent) and speak Spanish as their first language. The descendants of the Maya (about 10 percent of the population), are divided among those who speak the Mopan and Yucatec Maya dialects, and those who speak Kekchi. The Black Caribs (descendants of Africans and Carib Indians, who comprise another 10 percent of the population) speak Garifuna and predominate in the District of

Stann Creek. East Indians are found in Belize City and in communities throughout the central and southern districts. In the past 20 years, German-speaking Mennonites have made an impact on Belizean agriculture far out of proportion to their numbers. In addition, a noticeable sprinkling of Chinese and Lebanese merchants, along with the many tourists who now pass through Belize City, give it a multicultural flavor normally found only in large cosmopolitan areas.

The Belizean economy is centered around the sugar industry in the two northern districts, citrus farming in the Stann Creek Valley, fishing along the coast and keys, forest products, some minor manufacturing, subsistence farming, and a smattering of tourism. Although almost 40 percent of the country is arable, and much of the national territory is held by the government (in contrast to many Caribbean and Central American nations where land is concentrated in a rural oligarchy) only about 10 percent of the land suited to agriculture is in use (Evensen, 1981). The importation and dependence on foreign food sources is endemic and causes a drain on the local and national economies.

Although there are few people who exhibit the clinical signs of starvation, malnutrition is widespread. Poor physical conditions and sanitary practices lead to intestinal parasites, gastroenteritis, and "contribute to the prevalence of energy-protein malnutrition" (Evensen, 1981).

Subsistence farming, the relative lack of public services and unemployment and underemployment have all contributed to the exodus from the villages to the towns, Belize City, and overseas, where some people estimate that as many as 15-20 percent of Belizeans

live. This mass movement from the rural areas to the cities exacerbates the country's underutilization of the potentially productive agricultural sector and places great stress on the overloaded urban communities.

2.2 Overview of Belizean Primary Education

The primary school system in Belize evolved as a church-state system of shared responsibilities and decentralized administration. This dichotomy of decision making affects every aspect of elementary education in the country. The Government, through the Ministry of Education (MOE) and District Education Officers, oversees the implementation of general curricular goals and instructional procedures. The Ministry provides most of the funds for school construction and teacher salaries. Twelve religious denominations administer the schools, with Roman Catholic, Anglican, and Methodists having the largest number of schools. These larger denominations appoint district Local Managers, who carry on the day-to-day administrative decisions concerning "their" schools' budgets, personnel, and long-range planning. General Managers for the denominations administer their school systems-within-the-system at the national level. Although the Government is clearly the dominant partner in the relationship, the religious denominations exercise certain functions in which they are semi-autonomous.

Primary education in Belize is free and compulsory to around age fifteen and consists of eight grades of instruction. There are approximately 210 primary (elementary) schools in the nation, with around 150 of them (about 72 percent) in the rural areas and vil-

lages. Of the approximately 37,000 students in the system's primary grades, about forty-five percent (16,650) are enrolled in rural schools. Many of the schools are located in one-room buildings of not-so-recent vintage. Student enrollment in rural schools varies from about 90-250 students, separated into mixed grades of the Infant Schools (grades 1-3), Middle Primary (grades 4-5), and Senior Primary (grades 6-8) Divisions (see Appendix-B).

The curriculum of the primary schools before REAP, was structured on the British model of academic training in Mathematics, Language Arts, Science, Social Studies, the Arts, and Religion. Over the past several years, the Curriculum Unit of the Ministry of Education has prepared curriculum guides for most of these subjects and issued them to the schools. However, these curriculum guides provide only general areas where students are expected to receive instruction, and are liberally interpreted by the Local Denominational Manager, principals, and teachers, when they translate them into daily, weekly, and yearly plans for instruction.
Although this local implementation of the primary school curriculum allows for adaptations to fit the organizational characteristics of the schools and socio-economic backgrounds of the students, it has resulted in a patch-quilt pattern of primary school instruction. Quite often, schools from the same denomination and the same district, separated by only a few miles, will have students in the same grades studying widely different subjects on different levels.

The instructional materials used in the schools are an amalgam of books gleaned from the Ministry and the central offices of the various religious denominations. Most of the more recent materials

are from the United Kingdom and the United States. Consequently, much of the content of the instruction is written in culturally loaded concepts and language difficult for the rural Belizean child to comprehend. The instructional materials vary from school to school regardless of the denominational affiliation of the school. Students receive instruction in content areas specified by the curriculum guides, but using different information sources.

The instructional methodology is quite traditional. Most instruction is provided by the teacher writing on a chalkboard and lecturing, while the children copy the lesson in their notebooks. Students play a passive role and learn most of their lessons by rote memorization.

The type and sophistication of instruction found in the classrooms is partially a result of the level of teacher preparation. Of the approximately 1,500 primary school teachers in Belize, about 60 percent (900 teachers) are in rural schools. Approximately 45 percent of the "trained teachers", who go through three years of additional academic education, pedagogical training, and supervised internship at the Belize School of Education end up in the "urban" district town schools or Belize City. Although 35 percent of the teachers nationwide are "trained teachers", in the rural primary schools approximately 46 percent of the teachers are "uncertificated" i.e., no training, (CARE, 1979) and 80 percent are untrained i.e., not graduates of a teacher's college (Massey, 1979). In most

cases, the principal of the school is a trained, experienced teacher, but the training of the staffs vary greatly, with the larger rural schools often having the better-trained, more sophisticated teachers.

Several types of examinations, all of which are written, are commonly used in primary schools. In-class tests are prepared by teachers and vary from one teacher to another, and from one year to the next. End-of-term and end-of-year grades are given in each school to determine which students progress to the next grade. The tests and criteria for passing a grade may vary from school-to-school, and from year-to-year, regardless of the denominational affiliation of the schools.

The national, standardized test which primary school children are required to pass to graduate from elementary school is the Belize National Selection Examination (BNSE). On e same day, students in all six districts who are considered ready to "sit" the BNSE are tested in Mathematics, Language Arts, Science, and Social Studies. The assumption is made that the Standard VI (Eighth grade, see Belizean-U.S. grade equivalents, Appendix-B) students sitting the BNSE will have received instruction in all the areas tested in this survey-type examination. In the last three years, passing in each subject has been determined by norm-referenced criteria.

Until the 1982 BNSE examination, students who wished to continue their education in the secondary schools competed for high school openings and scholarships on separate examinations. The BNSE now serves all three functions of an exit examination from elementary, plus secondary school entrance and scholarship grants.

Although much of the attention and effort of primary teachers is geared to assisting students to pass this all important examination and go on to secondary school, approximately 40 to 50 percent of rural primary school children never continue their educations past the eighth grade.

Even for those who enter high school and complete it, the opportunities for higher education in Belize are very limited. A private Roman Catholic two-year college offers Associate of Arts and Associate of Science degrees, and an extension of the University of the West Indies offers college-level courses in conjunction with the Belize School of Education. The Belize College of Arts, Science, and Technology (BELCAST) is organizing a community college system with college accreditation.

In a system which has structured the primary and secondary school curricula along academic goals intended to lead to a college or university education, only a very small percentage of rural children can presently be expected to overcome the academic, monetary, and social hurdles which block their paths. Thus, large numbers of rural children leave formal education with an academic emphasis on achieving unattainable goals, and with little preparation to transfer the academic knowledge and skills into practical terms.

2.3 Overview of the REAP Program

In September, 1975, an ad hoc committee convened to consider the deficiencies of the rural primary schools in Belize. Represented were the Ministry of Education and Sports, the Ministry of

Social Welfare, the Ministry of Natural Resources (Agriculture), CARE, Heifer Project International, and the U.S. Peace Corps. This unique inter-ministerial and international agency group boldly decided to revise the entire structure of Belizean rural primary education by establishing the Rural Education and Agriculture Program (later called Relevant Education for Agriculture and Production--REAP). The REAP Advisory Committee, which evolved from the ad hoc group, emphasized that REAP was to be an educational-curriculum revision project first, and an agricultural science project only as a vehicle for new and innovative teaching methods. According to the REAP Committee, the purpose of REAP was:

> ". . . (to) initiate and evaluate efforts to enrich the rural primary school experience and, in particular, attempt to prepare the child for a potentially more rewarding and attractive role in the countryside. The project will approach the difficulties with a new educational philosophy that through the development of new, more relevant curricula, the rigorous training of teachers with an integrated rural development orientation, and the establishment of a school farm which will serve, in effect, as an outdoor laboratory, the child can become better equipped to cope with

rural life, both to the child's own benefit and, in helping him participate intimately in developing the agricultural basis of the national economy, to the benefit of Belize, as well."

"The Thrust of the effort will be to integrate the different syllabuses with the rural environment, to make each subject taught bear directly upon the real world in which the children live and the problems they face there." (Government of Belize/CARE, 1976)

In the nine and one-half years since its inception, the REAP program has moved through three phases:

In the Pilot Phase (July, 1976 to June, 1979) the goals were to:

1. test the feasibility of the project, try various implementation strategies, and establish costs.

2. use cooperation between ministries and international agencies as a basic strategy, personified in the REAP Advisory Committee.

3. begin with international agencies providing the bulk of the technical assistance, material assistance, and logistical support, with the understanding that the Government of Belize (GOB) would assume more responsibility and costs as the project progressed.

4. develop a revised curriculum, supportive curricular and instructional materials, inservice training materials, and a REAP program for the Belize School of Education. Each school would have an Outdoor Education Centre (ODEC) which would consist of a new building, garden, coops, hutches, etc. for the practical application of learning in an agricultural setting.

5. provide project support, with the Ministry of Education supplying the school building and lands, retrained teachers and principals, and an Education Officer to act as Project Manager. Heifer Project International would supply at cost, feeders, wire, chicks, baby rabbits, and some feeds. Peace Corps would supply volunteers who would act as technical support/ coordinators for the pilot schools, as well as an Agricultural Lecturer for the Belize School of Education/REAP program. CARE would supply tools, equipment, some agricultural supplies, limited funds for the construction of Outdoor Education Centres, and logistical/transportation support.

6. adopt and utilize a "Generalized Project Model" which was to provide a procedural framework for the Pilot Project Phase of the REAP program.

7. establish the REAP program in eight pilot primary schools in Belize District, Stann Creek District, and Toledo District; in one secondary school in Stann Creek; and at the Belize School of Education.

In the District-Level Phase (July, 1979 to June, 1982) the goals were to:

1. expand the REAP program to all six Districts in Belize, with a total of twenty-three REAP schools and three informal REAP schools (schools receiving minimal assistance).

2. transfer much of the technical assistance, material assistance, and logistical support from foreign agencies to the government's ministries, district-level officials, community groups, and service organizations.

3. continue the development and revision of curricular and instructional materials, the inservice materials, and the program at the Belize School of Education.

4. construct fourteen storage buildings, which were to replace the function of the Outdoor Education Centres.

During the anticipated National-Level Phase (July, 1982 to June, 1985) the goals were to:

1. expand the REAP program to sixty-five REAP schools and thirty-five REAP informal schools, covering approximately two-thirds of the rural primary schools in Belize.

2. complete the transfer of the support role from international to Belizean organizations.

3. complete the development/revision of curricular and instructional materials, the inservice materials, and the program at the School of Education.

4. construct an additional forty-three storage buildings at REAP schools.

5. establish linkages with other educational and training agencies, to provide an avenue for the continuing education and training of students interested in further rural-oriented education.

This final phase would be open-ended, in that the GOB would continue to expand the REAP program in rural and urban primary schools until all primary schools were in REAP.

2.4 Overview of the Evaluation Methodologies

Three different methodologies (questionnaire, comparative and correlational statistical studies, and competency-based tests) were scheduled to be used to evaluate the three major aspects of REAP covered in the evaluation. Each of these is described in the first part of the appropriate section which follows.

3.0 REAP PROGRAM/SCHOOL EVALUATION

3.1 Overview of the Program/School Evaluation Methodology

Because there were no measurable objectives for conducting a REAP evaluation, an analysis of REAP's goals and objectives was undertaken in October, 1977. In addition to reviewing all relevant documents and memoranda, all of the program's administrators, principals, and teachers were interviewed. As a result of the analysis, the REAP National Advisory Committee (REAP/NAC) adopted a model (see Appendix-A) which provided a process and format for specifying measurable objectives, called the Statements for Program Evaluation. These statements were revised four times by REAP/NAC and formed the basis for seven formative evaluations.

Beginning in January 1983, these statements were transformed into a 43-item School Evaluation Questionnaire (see Appendix-C) using the following procedure:

3.1.1 The REAP program Manager, Assistant Manager, and the Curriculum Development Officer (all from the Ministry of Education) and the CARE/REAP Agricultural Specialist were asked to identify from the Statements for Program Evaluation and their own past experience the major REAP school-program variables which they considered important for a quality REAP program. They chose:

-- the administration of REAP schools,

-- the REAP curriculum/instruction,

-- the REAP principals,

-- the REAP teachers,

-- the REAP agricultural program,

-- the REAP parent-community partcipation, and

-- the REAP impact on the community.

3.1.2 Next, they were asked to designate questionnaire items for each of these seven REAP program quality sub-variables.

3.1.3 After brainstorming had generated, combined, and reduced the number of questionnaire items, each person was asked to weight each of the items as to its importance to the sub-variable of the REAP program. The following weighting scale was used:

-- one point--important for a quality program, but the program could function without it;

-- two points--important enough to seriously impair the quality and functioning of the REAP program if it were missing;

-- three points--so important that a quality REAP program could not function without it.

The same group of individuals repeated this process separately and in groups three times over a period of 18 months. Each time they received feedback from the previous round, until there was concensus on forty-three questionnaire items and their weights.

3.1.4 The 43 items in seven sub-variable groups were then put into a REAP school program evaluation questionnaire with a four-point, forced-choice scale. A cummulative score of 1-4 (lowest-highest) on all items in a program sub-variable indicated the lowest and highest quality rating a school could receive for that program sub-variable. Scores of 4 on all 43 items in the seven program sub-variables equaled the highest score a school could attain on quality (see Appendix-C, REAP School Evaluation Questionnaire).

3.1.5 Ratings of REAP school program quality were done for each school by as many as five of the following categories of raters:

-- Ministry of Education REAP Program Managers,
-- a REAP District Council member,
-- a Peace Corps Volunteer,
-- the principal of each school, and
-- a CARE/REAP staff member.

Fifty-four REAP schools were evaluated using data from the three 1984-85 end-of-term REAP reports completed by each school; frequent MOE/CARE REAP staff visits to the schools during 1984-85; interviews; and special trips to the schools. One-hundred and eighty three (183) evaluations were done for an average of 3.38 evaluations per REAP school.

The Statistical Package for the Social Sciences (SPSS) was used to weight the 43 items and calculate the quality ratings in the seven program quality areas (sub-variables) and overall quality score. Mean (average) scores and standard deviations were also calculated per category of evaluation rater, district, school, and each of the 43 questionnaire items. Where appropriate, quality ratings were expressed as weighted average percentages of a perfect score. Adjustment for different numbers of questionnaire items in each of the quality sub-variables and variable of overall quality was made through the use of weighted mean percentages, rather than use of standard scores.

An eighth program quality sub-variable, staff inservice training, was computed from selected items from the principal and teacher quality sub-variables.

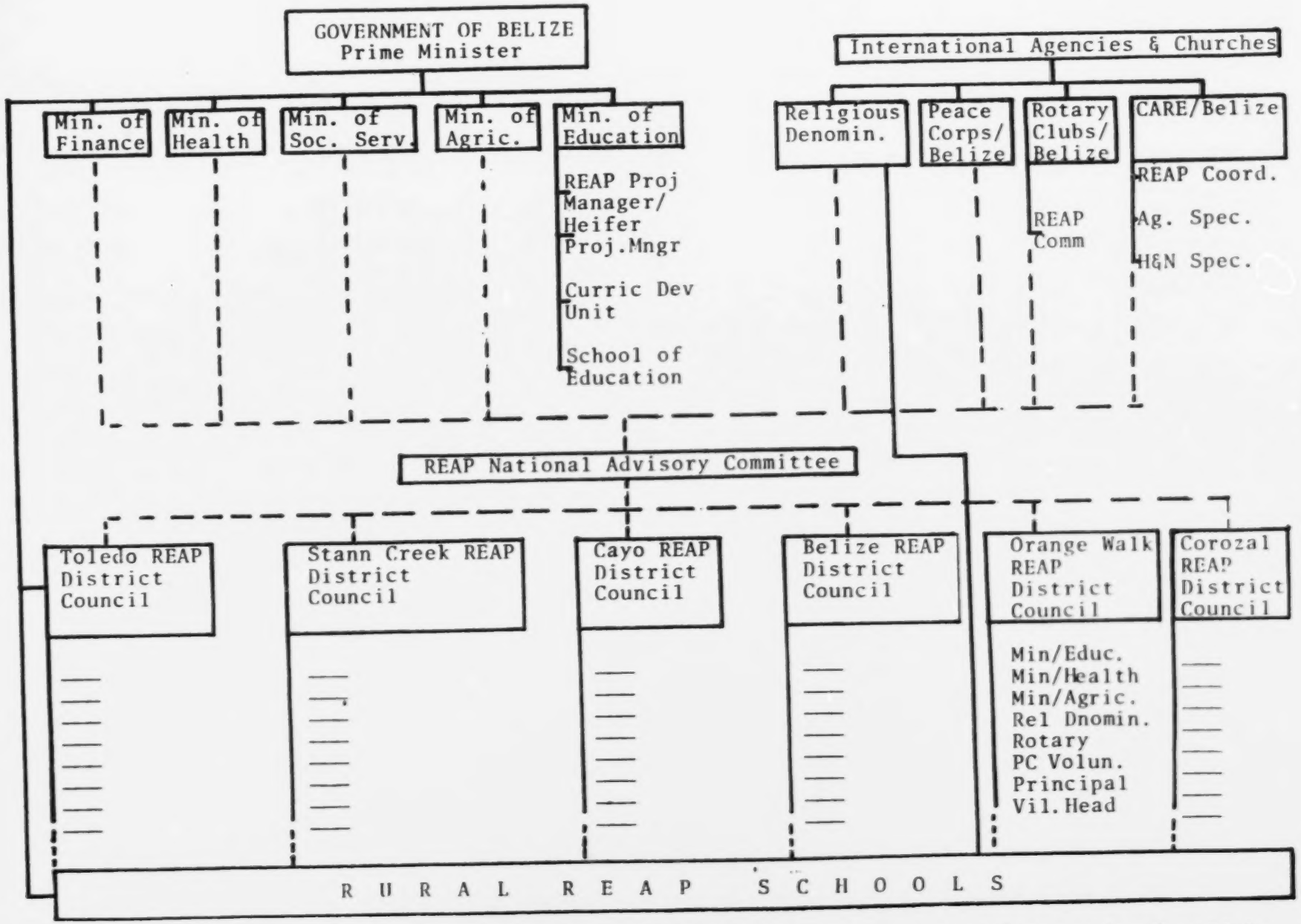
Pearson Product Moment Correlation Coefficients with two-tailed tests of significance were run between the weighted mean percentages of the eight quality sub-variables and the weighted mean percentages of the overall program quality variable to establish the strength of each relationship.

3.2 Overview of the REAP Program Administration

Before beginning a review of the REAP school administrative practices, it would be useful to look at the administration of REAP at the national and district levels.

The REAP National Advisory Committee (REAP/NAC) is composed of: representatives of the participating Government of Belize (GOB) ministries (Education, Health, Agriculture, Finance and Social Services); representatives of the religious denominations (called General Managers) who, thru Local Managers, administer the rural primary schools; representatives of participating international organizations (such as CARE, Peace Corps, Heifer Project International, and Rotary); and representatives of the REAP District Councils (REAP/DC). The REAP/NAC has functioned as a forum for: coordinating REAP activities; for studying problems through subcommittees; for proposing national policy; and for providing political support for REAP through the individual GOB ministries, organizational leadership, and funding agencies (see Figure 3).

Fig.3 : REAP Organizational Structure *



* LEGEND : Unbroken Lines = direct authority ; Broken Lines = agreements and communication links

The REAP/DCs are inter-ministerial, multi-agency groups established in each of Belize's six districts to plan, administer, facilitate, and evaluate REAP at the district and school levels. In the three years since their inception, they have done site surveys for new REAP schools, planned and conducted inservice training, provided logistical and material support for REAP schools, and have begun their own financing schemes. During the political hiatus caused by the election of a national government in December, 1984, and during a time of diminishing direct support activities by CARE, the REAP/DCs have provided a strong local structure for the continuation of REAP (see Figure 3).

3.3 REAP Program/School Evaluation Data Presentation and Analysis

3.3.1 REAP **program administration quality** at the school level was measured by the following four questionnaire items:

item 30 - care of REAP laboratory equipment, instructional materials, tools, and other equipment;

item 31 - use of bank accounts and keeping financial records according to REAP procedures;

item 32 - prompt return of REAP reports; and,

item 33 - cooperation in coordination and/or participation in REAP functions.

The weighted, mean percent of possible points that could be scored by all 54 REAP schools in the quality of administrative practices is shown in Table 2. Ratings were done by all five categories of evaluators, but only the REAP staff from the Ministry of Education managed to rate all the REAP schools. Estimates of the quality of the school-level REAP administration ranged from 77.7 to 68.5 percent of the possible, with an all rater mean of 74.1 percent. The range of scores by district, (shown in Table 3) was greater, with the schools in Orange Walk District scoring a weighted mean percent of 82.1 and those in Belize District scoring 65.9 percent.

TABLE 2: Weighted Mean Percentages Scored by REAP Schools on Items 30-33 Measuring the Quality of Administration, by Category of Rater

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION*
REAP Staff (MOE)	54	68.5	10.9
District Council	27	75.7	17.8
Peace Corps Volunteers	25	75.0	17.7
Principals	40	76.6	15.2
CARE/REAP Staff	37	77.7	13.1
ALL RATERS	**183**	**74.1**	**14.8**

* means and std. dev. multiplied by 100 to convert to %

TABLE 3: Weighted Mean Percentages Scored by REAP Schools on Items 30-33 Measuring the Quality of Administration, by District

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION*
Belize	44	65.9	15.5
Cayo	23	74.7	11.1
Corozal	31	75.4	13.4
Orange Walk	35	82.1	13.2
Stann Creek	27	68.8	13.6
Toledo	23	81.3	12.4
ALL DISTRICTS	**183**	**74.1**	**14.8**

* means and std. dev. multiplied by 100 to convert to %

The raw scores for items 30, 31, 32, and 33 are illustrated in Tables 4, 5, 6, and 7. Two districts (Belize and Stann Creek) had average scores lower than the national average on the care of their REAP tools and equipment (see Table 4). Again, the same two districts reported lower scores than the national averages on keeping bank accounts and financial records (see Table 5). Three districts (Belize, Corozal, and Stann Creek) were not up to the national averages on returning REAP reports (see Table 6). Two districts (Toledo and Orange Walk) were rated considerably above the others in coordinating and participating in REAP activities (see Table 7).

The Pearson Product Correlation between national weighted mean percentages on the REAP school administrative practices variable and the overall quality variable was the third strongest relationship demonstrated (see Table 8).

The analysis of administrative practices indicates areas where improvement could be made. The validity of the findings are limited by a lack of a REAP procedures manual which would describe all required administrative practices. The less than ideal average scores on the care of tools and equipment and keeping, good financial records should be a source of immediate concern.

TABLE 4: Average Raw Score* On Item 30, Care of REAP Tools and Equipment, By District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.84	.914
Cayo	23	3.21	.795
Corozal	31	3.36	.551
Orange Walk	35	3.40	.695
Stann Creek	27	2.85	.662
Toledo	23	3.30	.635
NATIONALLY	**183**	**3.14**	**.764**

* 1 = Low; 4 = High

TABLE 5: Average Raw Score* On Item 31, Keeping Bank Accounts and Financial Records, By District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	1.71	.954
Cayo	23	2.39	1.118
Corozal	31	2.45	1.091
Orange Walk	35	2.83	.954
Stann Creek	27	2.33	.961
Toledo	23	2.70	1.063
NATIONALLY	**183**	**2.35**	**1.078**

* 1 = Low; 4 = High

TABLE 6: Average Raw Score* On Item 32, Returning Reports, By District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	3.16	.805
Cayo	23	3.39	.656
Corozal	31	3.26	.729
Orange Walk	35	3.54	.561
Stann Creek	27	3.07	.615
Toledo	23	3.44	.507
NATIONALLY	**183**	**3.30**	**.681**

* 1 = Low; 4 = High

TABLE 7: Average Raw Score* On Item 33, Coordinating or Participating in REAP Events, By District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.84	.805
Cayo	23	2.96	.767
Corozal	31	3.00	.775
Orange Walk	35	3.37	.731
Stann Creek	27	2.74	.764
Toledo	23	3.57	.728
NATIONALLY	**183**	**3.06**	**.806**

* 1 = Low; 4 = High

TABLE 8: Pearson Product Correlations of Weighted Mean Percentages of Eight REAP School Programs Quality Sub-Variables, With Overall School Quality Percentages

REAP SCHOOL PROGRAM QUALITY AREAS and Questionnaire Items	n	r	*p
Administrative Program Quality (Items 30-33)	183	.7668	.000
Curriculum Program Quality (Items 1-9)	183	.7777	.000
Principal Quality (Items 10-14)	183	.6500	.000
Teacher Quality (Items 15-18)	183	.4586	.000
Staff Inservice Quality (Items 10, 12, 13, 15, 17, 18)	183	.6538	.000
Agricultural Program Quality (Items 19-29)	183	.7832	.000
Parent-Community Participation Quality (Itmes 34-37)	183	.7197	.000
Community Impact Quality (Items 38-43)	183	.6525	.000

* two-tailed test of significance; p = .05 level

3.3.2 The REAP **curriculum and instructional program quality** at the school level was evaluated by the following eight items:

item 1 -- use of the REAP Curriculum Guide and REAP Yearly Plan;

item 2 -- use of Let's All REAP Together, the agricultural manual for REAP;

item 3 -- use of the Health and Nutrition Manual for Belize;

item 4 -- use of the supplementary textbooks supplied by REAP;

item 5 -- use of REAP Learning Activity Packs (LAPs);

item 6 -- use of Activity-Based Instruction;

item 7 -- use of Integrated Learning; and,

item 8 -- use of Skills Tests and Competency-based Criteria.

The weighted mean percent scored nationally by REAP schools on the curriculum-instructional program sub-variable (items 1-9) is shown by rater category in Table 9, and in Table 10 by District. All Raters said that the REAP schools, taken as a whole, had accomplished 68.8 percent of what an ideal REAP curriculum and instructional program should be (see Table 9). Two districts (Belize and Stann Creek) fell below the national norm (see Table 10).

TABLE 9: Weighted Mean Percent Scored by REAP Schools On Items 1-9 Measuring the Quality of the Use of the REAP Curricular and Instructional Program, by Rater Category

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	66.1	9.9
District Council	27	74.5	12.3
Peace Corps. Volunteers	25	62.3	15.0
Principal	40	71.9	13.4
CARE/REAP Staff	37	69.6	10.2
ALL RATERS	**183**	**68.8**	**12.4**

* means and std. dev. multiplied by 100 to convert to %

TABLE 10: Weighted Mean Percent Scored by REAP Schools On Items 1-9 Measuring the Quality of the Use of the REAP Curricular and Instructional Program, by District

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	67.4	14.1
Cayo	23	70.9	11.2
Corozal	31	72.9	12.4
Orange Walk	35	70.0	9.9
Stann Creek	27	61.3	10.5
Toledo	23	70.8	12.6
ALL DISTRICTS	**183**	**68.8**	**12.4**

* means and std. dev. multiplied by 100 to convert to %

Table 11, the use of the REAP Curriculum Guide and Annual Plan, shows two districts (Orange Walk and Stann Creek) utilizing these basic planning documents less than the national average. The REAP Curriculum Guide contains the ten REAP Areas of Study: 1) Soils, 2) Plants, 3) Animals, 4) Agricultural Practices, 5) Weather, 6) Land and Water, 7) Community Study, 8) Health and Nutrition, 9) Ecology, and 10) Career Education. These major subject areas are taught in the Senior Primary School (see Appendix-C--Belizean Grade Equivalents) on three leves: Standard IV (6th grade)--Introductory Level; Std. V (7th grade)--Developmental Level; Std. VI (8th grade)--Consolidatory Level.

The REAP curriculum has three goals that support and expand the traditional curriculum: first, REAP is used to teach subjects in the traditional curriculum when there is an exact duplication of the subject matter to be covered (i.e., vertebrates and invertebrates in science); second, REAP is used to reinforce the instruction in the traditional curriculum (i.e., teaching mixed numbers in math by using mixed numbers in measuring the garden, chicken coop, etc.); third, REAP is used to teach subjects not found in the traditional curriculum (raising chickens, gardening, etc.).

A half-dozen versions of the REAP Curriculum Guide were developed over the past nine years, but only recently (late 1984-85 school year) did it contain all of the reading references and activities, per grade level, that teachers needed to make the Guide useful. It is not surprising that there

was less than universal usage (see Table 11, national average of 2.93) of the Curriculum Guide and Yearly Plan in the past. In addition to being incomplete, two Guides, one for REAP and one for the traditional curriculum were disseminated, increasing the difficulties for the teachers. Beginning with the 1985-86 school year, REAP schools received a combined traditional and REAP Curriculum Guide for planning instruction. This will eliminate the doubt as to which document(s) to use. Together with increased inservice training, the revised Curriculum Guide should lead to greater use of these basic curriculum documents.

TABLE 11: Average Raw Score* On Item 1, Use of REAP Curriculum Guide and Yearly Plan, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.93	.728
Cayo	23	3.17	.650
Corozal	31	3.03	.605
Orange Walk	35	2.86	.648
Stann Creek	27	2.67	.480
Toledo	23	2.96	.767
NATIONALLY	**183**	**2.93**	**.663**

* 1 = Low; 4 = High

The lack of standardized, relevant texts led REAP (through CARE and Rotary International) to develop, disseminate, and diffuse a practical agricultural manual, Let's All REAP Together, a Health and Nutrition Manual for Belize which stresses the use of nutritious local foods, and 44 other texts oriented towards the Belizean environment (Caribbean Science Series). Tables 12, 13, and 14 illustrate a usage level of these materials which were on a par with use of the Curriculum Guide. the recent inclusion of these reference/textual materials in the REAP Guide and Learning Activity Packs (REAP/LAPs) should raise usage of them in the future.

TABLE 12: Average Raw Score* On Item 2, Use of Agricultural Manual, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.89	.618
Cayo	23	3.13	.626
Corozal	31	3.19	.654
Orange Walk	35	3.00	.642
Stann Creek	27	2.78	.641
Toledo	23	3.22	.671
NATIONALLY	**183**	**3.02**	**.650**

* 1 = Low; 4 = High

TABLE 13: Average Raw Score* On Item 3, Use of the Health and Nutrition Manual, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.73	.727
Cayo	23	3.26	.689
Corozal	31	3.19	.601
Orange Walk	35	2.94	.591
Stann Creek	27	2.67	.620
Toledo	23	2.96	.638
NATIONALLY	**183**	**2.93**	**.676**

* 1 = Low; 4 = High

TABLE 14: Average Raw Score* On Item 4, Use of Other REAP Textbooks, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.77	.774
Cayo	23	2.96	.562
Corozal	31	2.90	.746
Orange Walk	35	3.09	.702
Stann Creek	27	2.48	.580
Toledo	23	2.78	.736
NATIONALLY	**183**	**2.84**	**.715**

* 1 = Low; 4 = High

The REAP/LAPs (see Appendix-D for sample) are the basic classroom tools that were developed to combine the 10 REAP Areas of Study and the reference materials into an innovative instructional format. The REAP/LAPs also incorporate activity-based instruction, integrated learning, competency-based instruction, and criterion-referenced testing. Approximately 148 REAP/LAPs have been developed by the REAP principals and teachers, mainly during the curriculum workshops that prepare them to teach in the REAP program. These extended lesson plans incorporate the innovative instructional procedures as follows:

-- Competency-based instruction is built into the REAP/LAPs in the form of measurable objectives; the instruction is aimed at student accomplishment of the objective(s).
-- Criterion-referenced knowledge and skill tests are included to evaluate accomplishment of the objectives.
-- Activity-based instructional activities (buzz groups, panels, skits, role playing, brainstorming, experiments, task groups, etc.) are specified in each REAP/LAP.
-- Integrated learning activities, combining the learning of new REAP-oriented knowledge and skills with reinforcement of the traditional subjects, are also specified in each REAP/LAP.

Tables 15, 16, 17, and 18 illustrate the use of these educational innovations and demonstrate a considerable amount of room for improvement. In particular, the relatively low utilization of the REAP/LAPs (Table 15) and skills tests and competency-based criteria (Table 18) show a need for more inservice training in these critical areas.

TABLE 15: Average Raw Score* On Item 5, Use of REAP Learning Activity Packs (REAP/LAPs) by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.14	.852
Cayo	23	2.48	.730
Corozal	31	2.29	.902
Orange Walk	35	2.20	.759
Stann Creek	27	1.85	.662
Toledo	23	2.57	.896
NATIONALLY	**183**	**2.23**	**.827**

* 1 = Low; 4 = High

TABLE 16: Average Raw Score* On Item 6, Use of Activity-Based Instruction, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.91	.709
Cayo	23	2.78	.422
Corozal	31	3.00	.683
Orange Walk	35	2.86	.648
Stann Creek	27	2.52	.643
Toledo	23	2.83	.650
NATIONALLY	**183**	**2.83**	**.654**

* 1 = Low; 4 = High

TABLE 17: Average Raw Score* On Item 7, Use of Integrated Learning, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.86	.702
Cayo	23	2.78	.671
Corozal	31	3.16	.688
Orange Walk	35	2.89	.631
Stann Creek	27	2.63	.565
Toledo	23	3.00	.674
NATIONALLY	**183**	**2.89**	**.670**

* 1 = Low; 4 = High

TABLE 18: Average Raw Score* On Item 8, Use of Skills Test and Competency-Based Criteria, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.52	.821
Cayo	23	1.87	.815
Corozal	31	2.65	.798
Orange Walk	35	2.63	.731
Stann Creek	27	2.11	.506
Toledo	23	2.45	.728
NATIONALLY	**183**	**2.41**	**.785**

* 1 = Low; 4 = High

Visits from other REAP schools, or to other REAP schools are viewed by participants as an excellent way to emphasize special aspects of each schools' REAP program. However, a relatively low score on this item (see Table 19) attests to the logistical problems involved in such outings.

TABLE 19: Average Raw Score* On Item 9, Number of Visits To-Or-From Other REAP Schools, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE	STANDARD DEVIATION
Belize	44	2.07	0.818
Cayo	23	2.48	0.846
Corozal	31	2.68	1.013
Orange Walk	35	2.94	0.802
Stann Creek	27	2.07	0.829
Toledo	23	2.26	0.864
NATIONALLY	**183**	**2.42**	**.915**

* 1 = Low; 4 = High

The sub-variable of curriculum and instructional practices was the second highest of eight factors correlated (.7777--see Table 8) with overall REAP school program quality.

Although greater use can be anticipated with the dissemination of revised, better prepared curricular materials, both use and proper implementation depend on inservice training which will prepare and support teachers in their use of the innovative REAP curriculum and instructional procedures.

3.3.3 The **quality of the REAP school principals** was evaluated using the following items:

item 10 -- principal's attendance at the 6-8 day summer curriculum workshop;

item 11 -- principal's attendance at the Belize School of Education's 1-2 year REAP program;

item 12 -- principal's attendance at the REAP agriculture inservice training;

item 13 -- principal's attendance at the health and nutrition inservice training; and

item 14 -- principal's attendance at REAP District Council Meetings.

Since the inception of REAP, the enthusiasm, knowledge, and skills of the principal were considered by REAP staff to be major predictors of the program's success in a school. The Pearson Product Correlation of eight REAP program quality sub-variables with the overall REAP program quality variable showed the relationship of principals' quality to be substantial (.6500--see Table 8) but only seventh out of eight correlated sub-variables.

A national weighted mean of 56.2 percent for principal quality (Items 10-14) was reported in all REAP schools, with three districts (Belize, Cayo, and Stann Creek) scoring lower means, as shown in Table 20 and 21.

TABLE 20: Weighted Mean Percent Scored by REAP Schools On Items 10-14 Measuring the Quality of the REAP Principals, by Rater Category

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	62.8	14.8
District Council	27	69.2	18.2
Peace Corps. Volunteers	25	61.3	18.5
Principal	40	66.4	15.4
CARE/REAP Staff	37	71.9	15.2
ALL RATERS	**183**	**66.2**	**16.4**

* means and std. dev. multiplied by 100 to convert to %

TABLE 21: Weighted Mean Percent Scored by REAP Schools On Items 10-14 Measuring the Quality of the REAP Principals, by District and Nationally

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	63.4	18.0
Cayo	23	65.4	15.7
Corozal	31	67.7	13.1
Orange Walk	35	69.0	14.4
Stann Creek	27	65.3	20.8
Toledo	23	66.8	15.7
ALL DISTRICTS	**183**	**66.2**	**16.4**

* means and std. dev. multiplied by 100 to convert to %

Item 10 (Table 22) measured principals' attendance at the 6-8 day summer curriculum workshop where participants learn to use and develop REAP/LAPs and the educational innovations they contain. Except for Belize District, the raw scores clustered around a national mean of 2.63.

TABLE 22: Average Raw Score* On Item 10, Principals Attendance at REAP Summer Curriculum Workshops, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.43	1.149
Cayo	23	2.70	1.020
Corozal	31	2.74	0.855
Orange Walk	35	2.86	1.004
Stann Creek	27	2.59	1.248
Toledo	23	2.52	1.082
NATIONALLY	**183**	**2.63**	**1.065**

* 1 = Low; 4 = High

The average raw score of 1.76 on item 11, shown in Table 23, Principals' Attendance at the Belize School of Education's REAP Program was much lower because most principals attended teachers' college before REAP became a part of the curriculum.

TABLE 23: Average Raw Score* On Item 11, Principals Attendance at Belize School of Education REAP, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.73	0.973
Cayo	23	1.22	0.518
Corozal	31	2.13	1.024
Orange Walk	35	1.49	0.702
Stann Creek	27	2.00	1.177
Toledo	23	2.00	1.044
NATIONALLY	**183**	**1.76**	**0.971**

* 1 = Low; 4 = High

Items 12 and 13 (Tables 24 and 25) shows the ratings given for technical inservice training in agriculture, and health and nutrition. No clear pattern is evident here. The national norms were 2.63 in agriculture and 2.53 in health and nutrition.

TABLE 24: Average Raw Score* On Item 12, Principals Attendance at Agriculture Inservice, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.71	1.091
Cayo	23	2.83	0.937
Corozal	31	2.61	0.882
Orange Walk	35	2.43	0.948
Stann Creek	27	2.67	1.177
Toledo	23	2.61	0.722
NATIONALLY	**183**	**2.63**	**0.979**

* 1 = Low; 4 = High

TABLE 25: Average Raw Score* On Item 13, Principals Attendance at Health and Nutrition Inservice, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.41	1.127
Cayo	23	2.70	0.822
Corozal	31	2.61	0.882
Orange Walk	35	2.54	1.094
Stann Creek	27	2.44	1.050
Toledo	23	2.52	0.790
NATIONALLY	**183**	**2.53**	**0.988**

* 1 = Low; 4 = High

Table 26 illustrates the attendance of the REAP principals at the REAP District Council (see Figure 3) meetings which are held monthly, bi-monthly, and quarterly, as needed. The relatively high raw scores, which ranged from 3.00 to 3.57, are significant because of the critical nature that principals' participation and decision making play in diffusing educational innovations. The REAP District Councils are the focal points for REAP diffusion, both within existing schools and for future expansion into new schools.

TABLE 26: Average Raw Score* On Item 14, Principals Attendance at REAP District Council Meetings, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	3.02	.976
Cayo	23	3.09	.793
Corozal	31	3.07	.814
Orange Walk	35	3.57	.558
Stann Creek	27	3.00	.877
Toledo	23	3.26	.864
NATIONALLY	**183**	**3.17**	**.844**

* 1 = Low; 4 = High

One factor that may have influenced the measurement of REAP principal quality is the number of new principals in the

54 REAP schools. Since 1979 when REAP begain to expand from the original 8 pilot schools, there has been a problem of trained REAP personnel being moved to non-REAP schools to fill pressing needs. Coordination with GOB and the denominational General Managers and Local (district) Managers has alleviated but not eliminated the problem.

3.3.4 The **REAP teacher quality** sub-variable was measured by:

item 15 -- teachers' attendance at 6-8 day summer REAP curriculum inservice training;

item 16 -- teachers' attendance at the Belize School of Education 1-2 year REAP program;

item 17 -- teachers' attendance at the agricultural inservice training; and,

item 18 -- teachers' attendance at the health and nutrition inservice sessions.

The weighted mean percentage of rated REAP teacher quality (items 15-18) is detailed by rater category in Table 27 and district in Table 28. The 53.5 percent of teacher quality achieved in Cayo District is just over half of what could be achieved, with the national average (58.4 percent) not much higher.

TABLE 27: Weighted Mean Percent Scored by REAP School On Items 15-18 Measuring the Quality of REAP Teachers, by Rater Category

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	64.5	12.6
District Council	27	60.6	15.5
Peace Corps. Volunteers	25	55.0	18.0
Principal	40	52.6	18.2
CARE/REAP Staff	37	56.5	16.7
ALL RATERS	**183**	**58.4**	**16.4**

* means and std. dev. multiplied by 100 to convert to %

TABLE 28: Weighted Mean Percent Scored by REAP Schools On Items 15-18 Measuring the Quality of REAP Teachers, by District

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	60.2	16.8
Cayo	23	53.5	14.7
Corozal	31	64.0	15.1
Orange Walk	35	57.0	18.5
Stann Creek	27	57.2	18.5
Toledo	23	55.9	11.7
ALL DISTRICTS	**183**	**58.4**	**16.4**

* means and std. dev. multiplied by 100 to convert to %

There was a considerable range of average raw scores on the number of teachers attending REAP curriculum workshops (see Table 29). Corozal District had the highest average raw score (2.65 out of a possible 4.0) with four other districts clustering around 2.20. The relatively low score on the curriculum inservice training (Item 15) may be related to the scores recorded for the relatively low use of the REAP/LAPs. Again, the movement of REAP-trained teachers to non-REAP schools would lower the quality of teachers in the program and this score.

TABLE 29: Average Raw Score* On Item 15, Teachers' Attendance at REAP Summer Curriculum Workshops, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.48	.762
Cayo	23	2.22	.671
Corozal	31	2.65	.839
Orange Walk	35	2.20	.901
Stann Creek	27	2.19	.921
Toledo	23	2.17	.717
NATIONALLY	**183**	**2.34**	**.822**

* 1 = Low; 4 = High

There was a higher number of teachers that attended the School of Education's REAP training than principals. Over the past six years, a conscious effort has been made by the Denominational General Managers to place teachers trained in the teachers' college REAP program in REAP (see Table 30).

TABLE 30: Average Raw Score* On Item 16, Teachers' Attendance at Belize School of Education REAP, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.18	0.947
Cayo	23	2.13	1.014
Corozal	31	2.32	0.945
Orange Walk	35	2.14	0.912
Stann Creek	27	2.26	0.944
Toledo	23	2.17	0.834
NATIONALLY	**183**	**2.20**	**0.924**

* 1 = Low; 4 = High

REAP schools are expected to have at least two Senior Primary teachers and the principal trained in the REAP curriculum, agricultural techniques, and health and nutrition. Table 31 (agricultural training) and Table 32 (health and nutrition training) indicate relatively low teacher attendance at these crucial inservice training sessions.

TABLE 31: Average Raw Score* On Item 17, Teachers' Attendance at Agriculature Inservice, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.64	0.917
Cayo	23	2.09	0.733
Corozal	31	2.68	0.653
Orange Walk	35	2.51	0.853
Stann Creek	27	2.59	1.010
Toledo	23	2.35	0.647
NATIONALLY	**183**	**2.51**	**.838**

* 1 = Low; 4 = High

TABLE 32: Average Raw Score* On Item 18, Teachers' Attendance at Health and Nutrition Inservice, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.27	.949
Cayo	23	2.04	.767
Corozal	31	2.52	.724
Orange Walk	35	2.34	.906
Stann Creek	27	2.22	.751
Toledo	23	2.30	.765
NATIONALLY	**183**	**2.30**	**.832**

* 1 = Low; 4 = High

The quality of teachers in REAP received the lowest correlation (.4586) of any of the sub-variables in their relationships to the computed overall REAP school quality.

With the diminution of CARE's role in providing strong technical assistance in curricular, agricultural, and health and nutrition inservice training for REAP principals and teachers, it will be all that much more important for the REAP/DCs to organize district-level preliminary and follow-up inservice training to raise the level of inservice training being received by teachers.

3.3.5 The **quality of the REAP school staff** (principals' and teachers') **inservice training** was the fifth highest correlated sub-variable (.6538--see Table 8) with the overall weighted mean percentage of quality. The inservice sub-variable was constructed from the principal quality sub-variable and the teacher quality sub-variable using the following items:

item 10-- principals' attendance at 6-8 day curriculum workshop (see Table 22);

item 12-- principals' attendance at agricultural inservice training (see Table 24);

item 13-- principals' attendance at health and nutrition in-service training (see Table 25);

item 15-- teachers' attendance at 6-8 day curriculum workshop (see Table 29);

item 17-- teachers' attendance at agricultural inservice training (see Table 31); and,

item 18-- teachers' attendance at health and nutrition in-service training (see Table 32).

The weighted mean percentages for the quality of inservice training had a range of 55.0 to 65.5 percent (see Table 33) among the various raters, and a range among Belize's six districts of 59.9 to 66.2 percent (Table 34). The weighted mean percent scored by schools in each district was less than two-thirds of the quality rating that was possible.

TABLE 33: Weighted Mean Percentage Scored by REAP Schools On Items 10, 12, 13, 15, 17, and 18 Measuring the Quality of REAP School Staff Inservice Training, by Category of Rater

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	65.5	12.8
District Council	27	65.0	17.2
Peace Corps. Volunteers	25	55.0	18.7
Principal	40	57.6	17.1
CARE/REAP Staff	37	65.2	16.0
ALL RATERS	**183**	**62.2**	**16.4**

* means and std. dev. multiplied by 100 to convert to %

TABLE 34: Weighted Mean Percentage Scored by REAP Schools on Items 10, 12, 13, 15, 17, and 18 Measuring the Quality of REAP School Staff Inservice Training, by District

DISTRICT	NUMBER OF RATING	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	62.0	19.0
Cayo	23	60.9	13.5
Corozal	31	66.2	11.7
Orange Walk	35	62.3	17.6
Stann Creek	27	60.9	18.8
Toledo	23	59.9	14.3
ALL DISTRICTS	**183**	**62.2**	**16.4**

* means and std. dev. multiplied by 100 to convert to %

Inservice training was considered a critical component of REAP from its very begninning. The standard procedure for providing inservice training before REAP was to have one or more education officers, usually from the Curriculum Development Unit, plan, coordinate and present lectures to gatherings of principals and teachers.

REAP developed and implemented a six-unit, multi-media, activity-based, competency-based set of inservice training materials consisting of an Inservice Participants Guide and six slide/audiotape cassettes. This set of materials was used in the 6-8 day summer curriculum workshops where approx-

imately 110 of the 140 REAP/LAPs were developed. The use of these materials helped standardize inservice training in curriculum development and curriculum utilization.

Five major developments in inservice training have taken place during 1984-85 which may increase principal and teacher utilization and competence in the REAP materials:

-- REAP District Councils have continued the process of decentralizing inservice training and have planned, coordinated, and conducted inservice training, with CARE, MOE, and other GOB ministry personnel providing technical assistance. This new model may free inservice training from the absolute limits imposed by the Curriculum Unit's scarce human and material resources.

-- Follow-up inservice training in agriculture and in health and nutrition have been offered, on a continuing basis, to support the REAP school staffs.

-- School visits have been made to all REAP schools by REAP/MOE and REAP/CARE staff to observe and assist teachers in applying activity-based, integrated instruction. These visits have provided new insights, both to the school and REAP staffs.

-- A group of 40-50 resource principals and teachers have been trained to act as cadres for diffusion of the REAP educational innovations in the districts. The formation of this group should facilitate the inservice efforts of the REAP/DCs, assist in follow-up inservice technical training, and help support teachers and principals at the school level.

-- District-level, yearly inservice training plans have been prepared to coordinate these efforts locally and meet identified needs.

REAP has introduced district-level and school-level inservice training that, in the opinion of the evaluator, is a necessary change for future progress. The highly centralized, national focus of previous MOE inservice efforts was sufficient at a time when the school curriculum was relatively stable. Changing social circumstances and the influx of new and innovative programs, such as REAP, have made the centralized model overly expensive and obsolete.

A reconceptualization of MOE's inservice delivery models, which include the REAP/DCs, resource teachers and technical assistance agencies is needed: a new model should provide for national, district, and most importantly, school-level inservice activities that will raise the quality of the REAP curriculum and instructional programs through its principals and teachers.

3.3.6 The **agriculture program quality** sub-variable had the highest correlation of the eight sub-variables with overall REAP program quality (.7832--see Table 8) and was defined by the following questionnaire items:

item 19-- school has adequate land;

item 20-- garden has adequate fence;

item 21-- school has adequate water supply;

item 22-- students maintained REAP facility;

item 23-- accurate agricultural production records kept;

item 24-- students raised vegetables;

item 25-- students raised poultry;

item 26-- students produced honey;

item 27-- students raised other crops;

item 28-- students participated in an agriculture-related field trip or event; and

item 29-- REAP school leavers (graduates) had a school-sponsored, agriculture-related project.

The weighted mean percentage of all REAP schools on these eleven items (19-29) was 65.0 percent of the possible quality rating as scored by All Raters (Table 35). The range by District was from 60.1 to 68.2 percent (Table 36).

TABLE 35: Weighted Mean Percent Scored by REAP Schools On Items 19-29 Measuring the Quality of the REAP Agricultural Program, by Category of Rater

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	64.3	9.4
District Council	27	66.1	12.2
Peace Corps. Volunteers	25	62.1	10.4
Principal	40	64.4	11.1
CARE/REAP Staff	37	67.8	11.3
ALL RATERS	**183**	**65.0**	**10.8**

* means and std. dev. multiplied by 100 to convert to %

TABLE 36: Weighted Mean Percent Scored by REAP Schools On Items 19-29 Measuring the Quality of the REAP Agricultural Program, by District

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	61.0	10.5
Cayo	23	63.8	9.9
Corozal	31	67.9	10.1
Orange Walk	35	69.7	9.1
Stann Creek	27	60.1	10.0
Toledo	23	68.2	12.0
ALL DISTRICTS	**183**	**65.0**	**10.8**

* means and std. dev. multiplied by 100 to convert to %

The raw score ratings by District, for REAP schools having adequate land (see Table 37), an adequate garden fence (Table 38) and an adequate water supply (Table 39) were 2.49, 2.40, and 2.56, respectively. These scores were not very high, given the importance of these requirements for gardening. The school-based REAP model requires that land fairly close to the school be used for the REAP garden. Because school buildings were not located with regards to good agricultural land and a convenient supply of water, at some REAP schools location is a serious problem. The Ministry of Public Works has drilled wells for some schools, and parents have dug wells for others. The inclusion of new schools may account for some of the low scores in garden fencing.

TABLE 37: Average Raw Score* On Item 19, Adequage Land For Schools, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.21	.878
Cayo	23	2.39	.783
Corozal	31	2.55	.575
Orange Walk	35	2.54	.741
Stann Creek	27	2.63	.688
Toledo	23	2.78	.850
NATIONALLY	**183**	**2.49**	**.790**

* 1 = Low; 4 = High

TABLE 38: Average Raw Score* On Item 20, School Has An Adequate Garden Fence, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.18	.786
Cayo	23	2.78	.671
Corozal	31	2.61	.761
Orange Walk	35	2.49	.702
Stann Creek	27	2.07	.675
Toledo	23	2.39	.783
NATIONALLY	**183**	**2.40**	**.763**

* 1 = Low; 4 = High

TABLE 39: Average Raw Score* On Item 21, School Has Adequate Water Supply, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.52	0.902
Cayo	23	2.35	0.832
Corozal	31	2.74	1.064
Orange Walk	35	2.83	0.923
Stann Creek	27	2.44	0.641
Toledo	23	2.30	0.876
NATIONALLY	**183**	**2.56**	**0.899**

* 1 = Low; 4 = High

Maintenance of the REAP agricultural facilities such as storage areas, coops, fences, etc. was fairly high (3.39 out of 4.0--see Table 40) over all three terms of the school year and in all Districts ranging from 3.17 in Cayo to 3.65 in Toledo. Part of the care for REAP facilities may be attributable to the fact that the students and parents built the facilities in the first place.

TABLE 40: Average Raw Score* On Item 22, Students Maintained REAP Facility, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	3.41	.897
Cayo	23	3.17	.778
Corozal	31	3.19	.703
Orange Walk	35	3.63	.598
Stann Creek	27	3.26	.984
Toledo	23	3.65	.714
NATIONALLY	**183**	**3.39**	**.804**

* 1 = Low; 4 = High

Table 41 displays a national average of 3.02 in keeping accurate agricultural records. Much of the record keeping is done by both the school staff and the students as part of the integrated approach to learning.

TABLE 41: Average Raw Score* On Item 23, Keeping Accurate Agricultural Records, by District and National Average

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	3.00	.715
Cayo	23	3.04	.706
Corozal	31	3.03	.875
Orange Walk	35	3.09	.781
Stann Creek	27	2.85	.662
Toledo	23	3.13	.869
NATIONALLY	**183**	**3.02**	**.763**

* 1 = Low; 4 = High

Tables 42 through 45 show an uneven production of different crops. Most districts had relatively high vegetable production (Table 42), considerably lower poultry production (Table 43), and substantial, but not overly impressive production of honey (Table 44), and other crops such as flowers, rabbits, etc. (Table 45).

To a certain degree, the scores reflect the fact that certain crops can only be produced at certain times of the year. Another factor has been the availability of the agricultural inputs such as seeds, feed, chicks, etc. During the first 4-5 years of REAP, Heifer Project International and CARE delivered these supplies to the schools. Since then the schools have been responsible for acquiring many of their own supplies. Reliable sources of supplies must be identified or

developed if the agricultural program in the REAP schools is to continue as an effective teaching component and source of income for the REAP program.

Details of the actual crop production is given in Section 5.4.

TABLE 42: Average Raw Score* On Item 24, Students' Vegetable and Other Crop Production, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	3.18	.756
Cayo	23	3.04	.638
Corozal	31	3.07	.854
Orange Walk	35	3.43	.608
Stann Creek	27	2.93	.781
Toledo	23	3.35	.775
NATIONALLY	**183**	**3.18**	**.750**

* 1 = Low; 4 = High

TABLE 43: Average Raw Score* On Item 25, Students' Poultry Production, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.57	.846
Cayo	23	1.78	.902
Corozal	31	2.19	1.014
Orange Walk	35	2.11	.832
Stann Creek	27	1.78	.934
Toledo	23	1.52	.994
NATIONALLY	**183**	**1.83**	**.937**

* 1 = Low; 4 = High

TABLE 44: Average Raw Score* On Item 26, Students' Production of Honey, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.21	1.07
Cayo	23	2.09	1.08
Corozal	31	2.71	0.902
Orange Walk	35	3.27	0.750
Stann Creek	27	2.59	0.971
Toledo	23	2.65	0.935
NATIONALLY	**183**	**2.60**	**1.03**

* 1 = Low; 4 = High

TABLE 45: Average Raw Score* On Item 27, Students' Production of Other Crops**, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.86	0.905
Cayo	23	2.09	0.793
Corozal	31	2.25	1.032
Orange Walk	35	2.37	0.973
Stann Creek	27	2.00	0.784
Toledo	23	2.78	1.09
NATIONALLY	**183**	**2.19**	**0.967**

* 1 = Low; 4 = High
** flowers, rabbits, etc.

REAP schools participated in agriculturally-related events and field trips throughout the country (see Table 46). The two districts, Corozal and Orange Walk, which have the largest agro-business companies and easiest transportation showed the most amount of activity in REAP-related visits.

TABLE 46: Average Raw Score* On Item 28, Students' Participation in Other Events, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.09	.884
Cayo	23	2.30	.765
Corozal	31	2.90	.790
Orange Walk	35	2.49	.887
Stann Creek	27	1.93	.958
Toledo	23	2.52	.898
NATIONALLY	**183**	**2.36**	**.914**

* 1 = Low; 4 = High

A "school leaver" in Belize is a category used primarily for those students who successfully complete Std. VI (8th grade) and leave the primary school. It does not mean "drop-out." Table 47 shows the relatively low scores that were given to the number of students who complete primary school and undertake a personal project sponsored by the REAP school. REAP was never planned to go beyond the physical limits of the school or age limits of the children in attendance. Yet, there has been intense interest in whether or not the school leavers, or graduates, put their REAP knowledge and skill to work. A report (Guilliam, 1983) of REAP school leavers showed that there was not a great deal of knowledge about some students after they left school. Those who could be identified and interviewed indicated a relatively low

number of individual REAP-related projects. Reasons given for this lack of follow-through included lack of technical assistance and financial backing.

GOB and CARE/Belize initiated a pilot project in late 1985 to encourage school-leavers to use REAP related knowledge and skills (Project GROWTH-Gaining A Realistic Orientation to Work, Training, and Help).

TABLE 47: Average Raw Score* On Item 29, School Leavers Projects, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.59	0.787
Cayo	23	1.83	0.834
Corozal	31	2.03	0.983
Orange Walk	35	1.80	0.833
Stann Creek	27	1.33	0.555
Toledo	23	2.22	1.085
NATIONALLY	**183**	**1.78**	**0.883**

* 1 = Low; 4 = High

3.3.7 Items 34-37 of the questionnaire dealt with the **quality of participation of parents and community members in the REAP programs**, as follows:

item 34-- community knowledge about REAP;
item 35-- community attendance at REAP events;
item 36-- community contributions to REAP; and,
item 37-- special REAP program accomplishments.

The participation of parents and other community members in the REAP program was the fourth highest correlated quality sub-variable with this year's overall REAP program quality scores (.7197--see Table 8) as measured by the Pearson Product Correlation Coefficient. Except for the District Council raters, the schools were given less than half of the quality ratings for parent-community participation that could have been achieved (Table 48). District-level weighted mean percentages varied greatly, from a low of 39.8 percent in Stann Creek District to 55.2 percent in Orange Walk District (Table 49).

TABLE 48: Weighted Mean Percent Scored by REAP Schools On Items 34-37 Measuring the Quality of Parent-Community Participation in REAP, by Category of Rater

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	45.2	12.0
District Council	27	51.1	16.7
Peace Corps. Volunteers	25	44.8	14.2
Principal	40	49.3	14.9
CARE/REAP Staff	37	48.5	17.4
ALL RATERS	**183**	**47.6**	**14.9**

* means and std. dev. multiplied by 100 to convert to %

TABLE 49: Weighted Mean Percent Scored by REAP Schools On Items 34-37 Measuring the Quality Parent-Community Participation in REAP, by District

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	40.0	12.9
Cayo	23	50.7	15.6
Corozal	31	53.4	17.7
Orange Walk	35	55.2	11.8
Stann Creek	27	39.8	10.3
Toledo	23	48.7	12.5
ALL DISTRICTS	**183**	**47.6**	**14.9**

* means and std. dev. multiplied by 100 to convert to %

Community knowledge about REAP, measured by item 34 and depicted in Table 50, was relatively low, with the lowest raw score (1.50 out of 4.0) going to Belize District, the only district with no new REAP schools during the 1984-85 school year. The scores indicated that nationally, 45 percent of community members could describe the broad goals, aims, procedures, and accomplishments of the REAP program in their community.

TABLE 50: Average Raw Score* On Item 34, Community Knowledge about REAP by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.50	.699
Cayo	23	2.04	.928
Corozal	31	1.94	.772
Orange Walk	35	1.94	.684
Stann Creek	27	1.78	.698
Toledo	23	1.65	.714
NATIONALLY	**183**	**1.79**	**.758**

* 1 = Low; 4 = High

Attendance at REAP events such as special REAP meetings, shows, cookouts, etc. was somewhat higher with a national average of 47 percent of community members attending at least one event (Table 51).

TABLE 51: Average Raw Score* On Item 35, Community Attendance at REAP Events, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.50	.629
Cayo	23	2.04	.976
Corozal	31	1.97	.657
Orange Walk	35	2.23	.547
Stann Creek	27	1.63	.742
Toledo	23	1.96	.562
NATIONALLY	**183**	**1.86**	**.725**

* 1 = Low; 4 = High

A similar proportion of community members nationally contributed work or gifts to REAP. There was a considerable range of raw scores on community contributions to REAP, with Belize district the lowest (1.27 out of 4.0) and Corozal District (2.03) and Orange Walk (1.97) the highest (Table 52). The Rotary Clubs of Corozal and Orange Walk actively supported REAP in their Districts and participated in policy making in the National REAP Advisory Committee.

Community efforts have been largely responsible, with donor participation through CARE and Rotary International, for the construction of outdoor classrooms and/or storage buildings in almost all of the 54 REAP schools evaluated. Community members also built coops, fences, dug wells, and

provided agricultural supplies (seeds, seedlings, fertilizer, wire, tools) and services (transportation, ploughing, etc.) in many of the REAP communities.

TABLE 52: Average Raw Score* On Item 36, Community Contributions to REAP, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.27	.544
Cayo	23	1.91	.793
Corozal	31	2.03	.875
Orange Walk	35	1.97	.518
Stann Creek	27	1.48	.643
Toledo	23	1.70	.822
NATIONALLY	**183**	**1.70**	**.758**

* 1 = Low; 4 = High

Special REAP accomplishments, such as a construction project, newsletter or special honors were fairly common, as measured by item 37 and shown in Table 53. A national average raw score of 2.19 and five districts with averages of 2.00 or more demonstrated this point.

TABLE 53: Average Raw Score* On Item 37, Special REAP School Accomplishment, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.02	.876
Cayo	23	2.13	.694
Corozal	31	2.42	.958
Orange Walk	35	2.57	.739
Stann Creek	27	1.59	.747
Toledo	23	2.35	.775
NATIONALLY	**183**	**2.19**	**.863**

* 1 = Low; 4 = High

Belizean rural schools ,like schools in many other parts of the world, have not traditionally been very well integrated into their communities. The rural school is the most common institution represented in the nation's villages. The teachers and principals live in the communities. But too often, the school has been a place where children go during the day, and that is all.

Although modest, the participation and contribution of parents and community members in REAP has impressed Belizeans and marks a distinct departure from the practice in the past. In many communities REAP-related projects were the first community projects in many years. Local community-level and

district-level support has sometimes been ahead of support at the national level, and may provide the most important promise for the future continuation of REAP.

3.3.8 REAP was conceptualized as a program to expand the knowledge, skills, and attitudes of the students. However, its functioning in small, interdependent village social systems has had an impact on the communities around the schools. The **quality of REAP impact on the community** was measured by items 38-43 as follows:

item 38-- increase in non-traditional home gardens;
item 39-- increase in non-traditional methods of raising poultry;
item 40-- increase in family production of honey;
item 41-- increase in the number of families adopting more nutritious diets;
item 42-- participation of principals and/or teachers in community leadership roles; and,
item 43-- more positive community attitude towards agriculture as a worthwhile career for children.

Raters had less empirical data to use in making the evaluations on community impact, yet had a relatively small range in their weighted mean national judgements (Table 54) from 56.5 percent by the Peace Corps Volunteers to 64.0 percent by the REAP/MOE staff. There was a greater range among

the Districts (from 55.3 to 68.4 percent--see Table 55) with a national weighted average of 61.2 percent of the quality ratings that were possible.

The Pearson Product Correlation Coefficient for community impact was the sixth highest (.6525--see Table 8) of the eight quality sub-variables correlated with overall program quality.

TABLE 54: Weighted Mean Percent Scored by REAP Schools On Items 38-43 Measuring the Quality REAP Community Impact, by Category of Rater

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	64.0	12.3
District Council	27	59.5	10.9
Peace Corps. Volunteers	25	56.5	13.7
Principal	40	60.2	12.5
CARE/REAP Staff	37	62.7	10.6
ALL RATERS	**183**	**61.2**	**12.1**

* means and std. dev. multiplied by 100 to convert to %

TABLE 55: Weighted Mean Percent Scored by REAP Schools On Items 38-43 Measuring the Quality REAP Community Impact, by District

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	55.3	11.7
Cayo	23	60.0	9.1
Corozal	31	66.9	9.5
Orange Walk	35	68.4	9.8
Stann Creek	27	57.2	15.0
Toledo	23	60.1	10.7
ALL DISTRICTS	**183**	**61.2**	**12.1**

* means and std. dev. multiplied by 100 to convert to %

The estimated increase in non-traditional home gardens was given an average national raw score of 2.32 (Table 56). Poultry raising had a similar estimated increase (2.15 nationally--see Table 57) but fewer families were estimated to have started beekeeping (an average national score of 2.0--see Table 58) as a result of REAP. Of these three activities, it takes less capital to begin a non-traditional garden than it does to raise poultry or produce honey using non-traditional methods, which may explain some of the difference in the scores.

TABLE 56: Average Raw Score* On Item 38, Increase In the Number of Home Gardens, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2,05	.608
Cayo	23	2.26	.541
Corozal	31	2.48	.626
Orange Walk	35	2.66	.591
Stann Creek	27	2.30	.669
Toledo	23	2.22	.600
NATIONALLY	**183**	**2.32**	**.638**

* 1 = Low; 4 = High

TABLE 57: Average Raw Score* On Item 39, Increase in Poultry Raising, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.05	.714
Cayo	23	2.04	.638
Corozal	31	2.29	.693
Orange Walk	35	2.34	.684
Stann Creek	27	2.00	.784
Toledo	23	2.13	.694
NATIONALLY	**183**	**2.15**	**.707**

* 1 = Low; 4 = High

TABLE 58: Average Raw Score* On Item 40, Increase in Beekeeping, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	1.66	.914
Cayo	23	1.91	.793
Corozal	31	2.13	.806
Orange Walk	35	2.23	.731
Stann Creek	27	1.85	.662
Toledo	23	2.39	.783
NATIONALLY	**183**	**2.00**	**.825**

* 1 = Low; 4 = High

The estimated increase in the adoption of more nutritious diets as a result of REAP (see Table 59) was rated nationally 2.41 out of possible 4.0. Of the considerable amount of vegetables produced at the REAP schools (see Section 5.4) about half is taken home by the students and teachers and the remainder sold. The estimated increase in home gardens, poultry raising, and honey production, together with more nutrition education in REAP could account for some of the estimated changes in diet.

TABLE 59: Average Raw Score* On Item 41, Increase in Nutritious Diets, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.18	.540
Cayo	23	2.22	.422
Corozal	31	2.74	.514
Orange Walk	35	2.66	.591
Stann Creek	27	2.26	.712
Toledo	23	2.39	.583
NATIONALLY	**183**	**2.41**	**.603**

* 1 = Low; 4 = High

The moderate estimated increases in principal and teacher leadership in their communities because of REAP (see Table 60) was across all districts, with a national raw score of 2.69, but was highest in Orange Walk (3.11).

TABLE 60: Average Raw Score* On Item 42, Increase in Leadership by Principals and Teachers, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.57	.900
Cayo	23	2.57	.788
Corozal	31	2.30	.836
Orange Walk	35	3.11	.718
Stann Creek	27	2.22	.751
Toledo	23	2.61	.783
NATIONALLY	**183**	**2.69**	**.848**

* 1 = Low; 4 = High

Attitudes towards agriculture as a worthwhile career for children also showed an estimated increase in REAP communities (see Table 61) with a national average of 2.61.

TABLE 61: Average Raw Score* On Item 43, Increase in Positive Attitudes About Agriculture, by District

DISTRICT/NATIONAL	NUMBER OF RATERS	AVERAGE RAW SCORE*	STANDARD DEVIATION
Belize	44	2.30	.553
Cayo	23	2.74	.449
Corozal	31	2.81	.477
Orange Walk	35	2.86	.550
Stann Creek	27	2.59	.844
Toledo	23	2.44	.507
NATIONALLY	**183**	**2.61**	**.607**

* 1 = Low; 4 = High

The estimated increases in non-traditional agricultural methods, nutritious diets, principal-teacher leadership in rural communities, and more positive attitudes towards agriculture are modest when compared to the force of tradition, limited resources, and limited career choices that characterize rural villages in Belize. However, over time, and in consort with other influences which are at work changing the rural environment in Belize, such as increased vocational education opportunities and the mass media, REAP seems to offer a promise of helping to move people in some of the directions desired by the Government of Belize, and apparently, some of its people.

3.3.9 The **overall REAP program quality** weighted mean percentage ratings on 43 quality items varied from 59.6 percent by the Peace Corps Volunteers to 65.2 percent by the District Council members. The All Raters national average was 63.0 percent (Table 62).

The overall quality weighted mean percentage ratings on all quality items varied from 58.5 percent for the schools in Stann Creek District to 67.4 percent for the REAP schools in Orange Walk (see Table 63).

TABLE 62: Weighted Mean Percent Scored by REAP Schools On Items 1-43 Measuring the Quality of the Overall REAP Program, by Category of Rater

CATEGORY OF RATER	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
REAP Staff (MOE)	54	62.2	8.5
District Council	27	65.2	10.1
Peace Corps. Volunteers	25	59.6	10.7
Principal	40	63.1	8.8
CARE/REAP Staff	37	65.0	9.9
ALL RATERS	**183**	**63.0**	**9.5**

* means and std. dev. multiplied by 100 to convert to %

TABLE 63: Weighted Mean Percent Scored by REAP Schools On Items 1-43 Measuring the Quality of the Overall REAP Program, by District

DISTRICT	NUMBER OF RATINGS	WEIGHTED MEAN PERCENTAGE*	STANDARD DEVIATION
Belize	44	59.0	10.3
Cayo	23	62.7	7.8
Corozal	31	66.9	8.6
Orange Walk	35	67.4	7.3
Stann Creek	27	58.5	10.2
Toledo	23	64.5	8.0
ALL DISTRICTS	**183**	**63.0**	**9.5**

* means and std. dev. multiplied by 100 to convert to %

3.3.10 Summaries of the weighted mean percentage scores, for the eight REAP program quality sub-variables, and overall quality scores, are presented by Rater Category (Table 64) and District (Table 65).

TABLE 64: Weighted Mean Percentage of Quality Achieved by REAP Schools On Eight REAP Program Quality Sub-Variables and Overall Quality on the 1984-85 REAP School Evaluation, by Category of Rater

EVALUATORS	CURRI.	PRINCIPAL	TEACHERS	STAFF INSERVICE TRAINING	AGRI. PROG.	ADMIN. PROG.	PARENT-COMMUNITY PARTIC.	COMMUNITY IMPACT	OVERALL PROGRAM QUALITY
REAP Staff (MOE)	66.1	62.8	64.5	65.5	64.3	68.5	45.2	64.0	62.2
District Council	74.5	69.2	60.6	65.0	66.1	75.7	51.1	59.5	65.2
Peace Corps Volunteers	62.3	61.3	55.0	55.0	62.1	75.0	44.8	56.5	59.6
Principals	71.9	66.4	52.6	57.6	64.4	76.6	49.3	60.2	63.1
CARE/REAP Staff	69.6	71.9	56.5	65.2	67.8	77.7	48.5	62.7	65.0
ALL RATERS	**68.8**	**66.2**	**58.4**	**62.2**	**65.0**	**74.1**	**47.6**	**61.2**	**63.0**

TABLE 65: Weighted Mean Percentage of Quality Achieved by REAP Schools On Eight REAP Program Quality Sub-Variables and Overall Quality on the 1984-85 REAP School Evaluation, by District

DISTRICTS	CURRI.	PRINCIPAL	TEACHERS	STAFF INSERVICE TRAINING	AGRI. PROG.	ADMIN. PROG.	PARENT-COMMUNITY PARTIC.	COMMUNITY IMPACT	OVERALL PROGRAM QUALITY
Belize	67.4	63.4	60.2	62.0	61.0	65.9	40.0	55.3	59.0
Cayo	70.9	65.4	53.5	60.9	63.8	74.7	50.7	60.0	62.7
Corozal	72.9	67.7	64.0	66.2	67.9	75.4	50.7	66.9	66.9
Orange Walk	70.0	69.0	57.0	62.3	69.7	82.1	55.2	68.4	67.4
Stann Creek	61.3	65.3	57.2	60.9	60.1	68.8	39.8	57.2	58.5
Toledo	70.8	66.8	55.9	59.9	68.2	81.3	48.7	60.1	64.5
ALL DISTRICTS	**68.8**	**66.2**	**58.4**	**62.2**	**65.0**	**74.1**	**47.6**	**61.2**	**63.0**

4.0 EVALUATION OF ACADEMIC STUDENT ACHIEVEMENT

4.1 Purpose of the Academic Evaluation

REAP, unlike many other innovative school programs, was not intended primarily to raise the level of students' academic achievement. Its primary purpose was to bring relevance to the academic curriculum by teaching children new knowledge and skills which would help them adapt better to their environment. However, academic achievement in REAP schools was not downgraded in any sense. On the contrary, the importance of maintaining academic achievement was stressed from the very beginning of REAP.

The Belize National Selection Examinations (BNSE) are viewed by parents and educators alike as the all-important tests which decide if a child will graduate from Std. VI (8th grade), will be admitted to a high school, and will receive financial aid to continue studying. The results of the past seven BNSE were analyzed to determine if the initial concerns of some parents and teachers about maintaining academic standards were well founded. The traditional null hypothesis of no significant difference between the population mean scores of REAP and non-REAP students on the BNSE was advanced, not to see if REAP students did better, but to see if they did worse.

4.2 Overview of Methodology for Evaluating Academic Achievement

The evaluation of academic achievement, based upon the 1984-85 BNSE results, was divided into two parts: first, REAP student achievement was compared with non-REAP student achievement to test for significant differences; second, REAP student achievement was

analyzed using variables approved by the REAP/NAC to establish, to the degree possible, the causes of variations in the REAP students' scores.

The entire population of 771 REAP and 584 non-REAP students who took the 1984-85 BNSE (see Table 66) were included in the analysis.

TABLE 66: Numbers of REAP and NON-REAP Schools and Std. VI (Eighth Grade) Students Included in the 1984-85 Academic Evaluation, by District

District	REAP		NON-REAP	
	Schools	Students	Schools	Students
Belize	10	144	16	125
Cayo	8	98	7	98
Corozal	10	130	14	142
Orange Walk	11	188	8	71
Stann Creek	8	108	11	80
Toledo	7	103	13	68
SUBTOTAL	**54**	**771**	**69**	**584**
GRAND TOTALS: 123 schools; 1,355 students				

Scores for the 1,355 students were gathered for use in the following dependent variables:

a. **Reading Comprehension** (Part I of English Language),

b. **English Language** (Reading Comprehension and Language Usage),

c. **Mathematics**,

d. **Social Studies**, and

e. **Science**.

Independent variables, approved by REAP/NAC for use in the analysis, included:

f. the **district** in which the students' schools were located,

g. the **school** itself,

h. the **size** of the **schools**,

i. the **religious denomination** of the school management, including government non-denominational schools,

j. whether the students were in **REAP**, or not,

k. the student's **sex**,

l. the student's **primary language**, and

m. how long a school had been in REAP, called **program maturity**.

The following school-level independent variables, generated for the REAP Program/School Evaluation (Section 3.0), were also used:

n. quality of the **REAP curricular-instructional programs**,

o. quality of the **principals**,

p. quality of the **teachers**,

q. quality of the **agricultural program**,

r. quality of the **REAP administrative program**,

s. quality of **parent-community participation**,

t. quality of **REAP community impact**, and

u. **overall REAP program quality**.

4.3 Academic Achievement of REAP and NON-REAP Students

The scores of all 771 REAP and 584 NON-REAP students on the five dependent variables were used to calculate three measures of central tendency: the population means (averages), the population

standard deviations (std. dev.), and the population variances. A one-way analysis of variance (ANOVA) was used with the F-test of the population means to determine if there were significant differences among the means of the sub-groups (levels) of the independent variables. For example, ANOVA was used to determine if there were significant differences among the three sub-groups means of the school size independent variable, which were small school, moderate sized school, and large school.

The Statistical Package for the Social Sciences (SPSS) sub-program BREAKDOWN (with the TABLES convention) was used to calculate the descriptive statistics, the one-way ANOVA, and also produce the Eta Squared statistic. The latter indicated the linear and non-linear variance in the dependent variable explained by the independent variable.

As shown in Table 67, the F-test scores of 771 REAP and 584 NON-REAP students on Reading Comprehension, English Language, Mathematics, Social Studies, and Science showed no significant differences between the population means of the two sub-groups (levels) at the $p = .05$ level. The Eta Squared statistic indicated that the independent variable, REAP Affiliation, explained less than one percent of the linear and non-linear variance in each of the dependent variables (BNSE test socres).

TABLE 67: Mean Scores of 771 REAP and 584 NON-REAP Students On The 1984-85 Belize National Selection Examinations, By REAP Affiliation, With F-Tests of Population Means, Eta Squared, and t-Test Values

BNSE TEST REAP/NON-REAP	n	POP. MEAN	STD. DEV.	ONE-WAY ANOVA F-RATIO VALUE	ONE-WAY ANOVA ETA SQUARED	T-TEST VALUE
Reading Comprehension REAP	771	24.188	6.843	0.1250*	.0001	0.3568*
NON-REAP	584	24.054	6.911			
English Language REAP	771	34.894	8.438	1.5446*	.0011	1.2553*
NON-REAP	584	34.320	8.374			
Mathematics REAP	771	23.763	7.120	0.1519*	.0001	0.3905*
NON-REAP	584	23.923	7.966			
Social Studies REAP	771	18.633	5.299	0.0882*	.0001	0.2987*
NON-REAP	584	18.545	5.591			
Science REAP	771	15.398	4.453	3.6791*	.0027	1.9392*
NON-REAP	584	14.933	4.374			

* No significant difference at $p = .05$ level

An interesting result of the ANOVA procedure were unusually low F-test scores in three-of-five dependent variables (see Table 67). These low scores were the result of unusually large sums of squares within groups. In Kerlinger's discussion of the computation of the F-tests of population variances, he states that, "The effect of

widely differing variances is to inflate within group variances. Consequently, an F-test may not be significant when in reality there are significant differences between the means" (Kerlinger, 1973).

Because of the similarities in the method of computing the F-test of population means (in the SPSS One-Way ANOVA) and the computation of the F-test of population variances referred to by Kerlinger, a second statistical procedure was undertaken to avoid accepting the null hypothesis erroneously. The SPSS t-test subprogram was utilized to reexamine whether significant differences existed between the 771 REAP students and 584 NON-REAP students scores. A three-step procedure was used. First, an F-test was conducted to test the assumption of the homogeneity of the population variances. The score from the F-test for homogeneity of population vairances was used to select the appropriate two-tailed t-test value (pooled variance estimate or separate variance estimate) generated by the SPSS program. Finally the t-test value was checked for significance at the $p = .05$ level and compared to the results of the ANOVA F-test of population means. As is detailed in Table 67, the conclusions arrived at after the second statistical procedure (t-tests) were identical to those arrived at in the first test for statistical significance; that is, there was no significant differences between the population mean scores of the REAP and NON-REAP students on all five BNSE scores. The null hypothesis was accepted; the 771 REAP students did neither better, nor worse than the 584 NON-REAP students on the 1984-85 BNSE examinations.

When REAP students with less than three years of REAP instruction were deleted from the population, the remaining REAP students

did somewhat better than NON-REAP students in the 1984-85 BNSE comparisons. REAP is primarily a program that operates in the Senior Primary grades (Stds. IV-VI; sixth-to-eighth grades). The REAP curriculum and annual plans use a step-by-step approach over these three years to introduce REAP and reinforce the traditional academic program. The entire population of 771 REAP students contained 269 students in 19 schools who had received only one or two years of REAP instruction.
The remaining 502 students had received the full three-year REAP program.

A comparison was made between the 1984-85 BNSE scores of all 584 NON-REAP and the 502 REAP students with three years of REAP instruction. Again, the one-way ANOVA and t-test procedures described earlier were utilized to test for significant differences between the two sub-groups (levels). Table 68 shows that there was no statistical difference at $\underline{p} = .05$ level between the mean scores of the REAP students with three years of REAP instruction and NON-REAP students on the 1984-85 BNSE Reading Comprehension, English Language, Mathematics, and Social Studies scores. However, REAP students with three years of REAP did significantly better than the NON-REAP students on the Science examination.

TABLE 68: Mean Scores of 502 REAP Students With a Full Three-Year REAP Program and 584 NON-REAP Students, On The 1984-85 Belize National Selection Examination, By REAP Affiliation, With F-Tests of Population Means, Eta Squared, and t-Test Values

BNSE TEST REAP/NON-REAP	n	POP. MEAN	STD. DEV.	ONE-WAY ANOVA F-RATIO VALUE	ONE-WAY ANOVA ETA SQUARED	T-TEST VALUE
Reading Comp. REAP	502	24.546	7.104	1.3280*	.0012	0.249*
NON-REAP	584	24.055	6.911			
English Language REAP	502	35.289	8.638	3.5077*	.0032	1.870*
NON-REAP	584	34.320	8.375			
Mathematics REAP	502	23.888	7.165	0.0056*	.0000	0.07*
NON-REAP	584	23.923	7.966			
Social Studies REAP	502	18.803	5.186	0.6157*	.0006	0.78*
NON-REAP	584	18.545	5.591			
Science REAP	502	15.761	4.605	9.2064**	.0084	3.03**
NON-REAP	584	14.933	4.374			

* No significant difference at p = .05 level

** Significant difference at p = .05 level

The findings in the analysis of the 1984-85 BNSE are consistent with BNSE scores recorded for the past seven years of REAP (see Table 69). On the twenty-five BNSE tests for which valid comparisons could be made between the scores of REAP and NON-REAP students, **REAP students have never scored significantly lower than NON-REAP students. On the contrary, in ten of the twenty-five BNSE examinations (3 Math, 3 Science, 3 English Language, and 1 Social Studies exams) REAP students scored significantly higher than their NON-REAP counterparts.**

Two conclusions may be drawn from the data and analyses presented:

First, participation in the innovative REAP program does not have a negative effect on students' achievement in traditional academic subjects, as measured by scores on the Belize National Selection Examinations.

Second, only a small part of the linear and non-linear variance in the BNSE test scores of REAP and NON-REAP students was accounted for by the REAP/NON-REAP independent variable.

TABLE 69: Mean Scores Of REAP AND NON-REAP Students On Belize National Selection Examinations, From 1979 to 1985, Tested for Significant Differences Using the t-Test

SCHOOL YEAR		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
REAP/NON-REAP	n	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.
1984-1985									
REAP	771	34.894*	8.438	23.763	7.120	18.633*	5.299	15.398*	4.453
NON-REAP	584	34.320	8.374	23.923*	7.966	18.545	5.591	14.933	4.374
1983-1984									
REAP	653	40.47*	10.159	23.21**	8.713	18.53*	5.142	17.44**	4.821
NON-REAP	636	39.64	11.060	22.07	8.517	18.40	5.231	16.90	4.920
1982-1983									
REAP	461	37.338*	10.278	24.857**	7.908	18.781*	5.312	15.987**	4.705
NON-REAP	415	36.299	9.723	23.590	7.379	18.142	5.269	15.325	4.496
1981-1982									
REAP	367	37.867*	6.853	30.189*	8.879	18.668*	5.021	17.455*	5.104
NON-REAP	268	37.351	10.311	28.993	9.415	18.249	5.050	16.771	4.935
1980-1981									
REAP	218	26.954**	13.544	10.212*	13.212	28.059*	6.844	21.500**	9.221
NON-REAP	181	24.265	8.463	8.918	5.855	27.722	7.481	19.767	5.150
1979-1980									
REAP	198	29.929**	8.062	13.864**	5.418	30.147**	6.212	NO DATA AVAILABLE***	
NON-REAP	198	28.091	8.554	11.904	5.618	28.276	8.034		
1978-1979									
REAP	130	36.962**	8.841	22.484*	6.662	NO DATA AVAILABLE***		NO DATA AVAILABLE***	
NON-REAP	130	33.769	8.903	21.639	6.027				

* No significant difference at $p = .05$ level.
** Significant difference at $p = .05$ level.
*** 1979 Social Studies and Science and 1980 Science Tests were special for REAP and not valid for comparison.

4.4 Academic Achievement of REAP Students

The scores of the REAP students who took the 1984-85 BNSE examinations were examined to establish whether there were significant differences within the REAP students' scores and what could account for the variations.

The Reading Comprehension scores of the 771 REAP students were correlated with their scores on the four BNSE examinations. The Pearson Product Correlation Coefficient (see Table 70) between Reading Comprehension and English Language was understandably high (.9378), as Reading Comprehension is a sub-score of the overall English Language Score. The other correlations ranged from a high of .5878 with Mathematics, to .5545 with Social Studies, and a low of .5156 with the Science scores.

TABLE 70: Pearson Product Correlation Coefficients of 771 REAP Student Scores on the 1984-85 BNSE, Between Reading Comprehension and English Language, Math, Social Studies, and Science Scores

		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
	n	COEFF.	p	COEFF.	p	COEFF.	p	COEFF.	p
Reading Comprehension	771	.938	.000	.588	.000	.555	.000	.515	.000

It was not deemed necessary to use both the F-test of population means and t-test statistics in the analysis of REAP student academic achievement. Please note that the F-test procedure indicates the significance of differences between population means, but does not indicate whether **specific sub-groups** (levels) means of an

independent variable have significant differences. Specific sub-group means may or may not be significantly different. For example, in Table 72 the F-test value for Mathematics (4.352) indicates significant differences between the sub-group mean scores of small, medium, and large schools. It does not indicate if the large school average score (24.243) is significantly different from the small school mean score (22.747), nor if the small school mean differs significantly from the medium-sized school mean (22.510).

A one-way analysis of variance with the 771 REAP students' reading comprehension scores as the dependent variable indicated significant differences (using the F-test of means--see Tables 71-76) when analyzed by district, size of the total school enrollment, sex, the student's primary language and the number of years the school had been in REAP. The one-way analysis of variance of reading scores by the religious denominational management of the schools showed no significant difference.

The Eta Squared statistic (indicating the linear and non-linear variance in the reading scores explained by the independent variable) was never more than 2 percent for any of the independent variables.

There were significant differences between the REAP student mean scores, by **District**, on the English Language, Math, Social Studies, and Science BNSE tests. The Eta Squared statistic indicated an explained linear and non-linear variance of less than 2 percent (.0168--see Table 71). Stann Creek had the highest and Corozal the lowest mean scores.

TABLE 71: Mean Scores Of 771 REAP Students On 1984-85 Belize National Selection Examinations, by District, With F-Test and Eta Squared Values

DISTRICTS	n	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.
Belize	144	23.889	7.488	35.208	9.131	22.771	7.363	17.035	5.057	14.694	4.292
Cayo	98	24.755	6.971	34.092	8.172	23.061	6.631	18.990	4.915	16.561	4.527
Corozal	130	23.592	6.321	33.954	7.577	24.377	7.430	19.054	5.727	15.377	4.460
Orange Walk	188	23.500	6.603	34.282	8.308	23.633	6.645	18.016	5.181	14.553	4.171
Stann Creek	108	26.307	7.104	37.361	8.636	27.019	7.693	20.935	5.068	17.296	4.900
Toledo	103	23.786	6.186	34.932	8.409	21.864	5.900	18.709	5.027	14.854	3.833

ONE-WAY ANOVA	df	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p
F-Test	5,765	3.076**	.0093**	2.611**	.0236**	7.216**	.0000**	7.793**	.0000**	7.991**	.0000**
Eta Squared		.0197		.0168		.0450		.0485		.0496	

** Significant difference at p = .05 level.

The **size of the school enrollment** independent variable showed significant differences on the Mathematics, Social Studies, and Science portions of the exams, but not on the English Language test (Table 72). Students from the largest rural schools had higher average scores on all four BNSE examinations; those from the smallest schools has the next highest mean scores; and students from the mid-sized schools had the lowest mean scores. The amount of linear and non-linear variation explained by the school size variable was less than 1.25 percent in all four tests.

The **religious denominational management** of the schools independent variable showed significant differences between the mean scores on English Language, Mathematics, and Social Studies, but not Science (see Table 73). The students in the Methodist schools had the highest average scores on all four tests, with Government-managed schools second highest on English Language, and Roman Catholic-managed schools second highest in Mathematics, Social Studies, and Science. The Eta Squared statistic showed explained linear and non-linear variances on the four tests ranging from approximately 1 to 3 percent.

TABLE 72: Mean Scores Of 771 REAP Students On 1984-85 Belize National Selection Examinations, by Size of School Enrollment, With F-Test and Eta Squared Values

DISTRICTS	n	READING COMP. MEAN	READING COMP. STD. DEV.	ENG. LANGUAGE MEAN	ENG. LANGUAGE STD. DEV.	MATHEMATICS MEAN	MATHEMATICS STD. DEV.	SOCIAL STUDIES MEAN	SOCIAL STUDIES STD. DEV.	SCIENCE MEAN	SCIENCE STD. DEV.
Small School (125 or less students)	75	24.013	6.355	35.040	8.031	22.747	6.000	18.480	5.444	15.373	3.834
Med. School (126-250 students)	149	22.873	6.458	33.436	8.196	22.510	6.784	17.376	5.254	14.430	4.208
Large School (More than 250 students)	547	24.570	6.973	35.271	8.529	24.243	7.303	18.996	5.248	15.665	4.565

ONE-WAY ANOVA	df	READING COMP. F-VALUE	READING COMP. p	ENG. LANGUAGE F-VALUE	ENG. LANGUAGE p	MATHEMATICS F-VALUE	MATHEMATICS p	SOCIAL STUDIES F-VALUE	SOCIAL STUDIES p	SCIENCE F-VALUE	SCIENCE p
F-Test	2,768	3.657**	.0263**	2.792*	.0619*	4.352**	.0132**	6.368**	.118**	4.534**	.0108**
Eta Squared		.0094		.0072		.0112		.0061		.0117	

* No significant difference at $p = .05$ level.
** Significant difference at $p = .05$ level.

TABLE 73: Mean Scores Of 771 REAP Students On 1984-85 Belize National Selection Examinations, by Religious Denomination (Management) of the Schools, With F-Test and Eta- Squared Values

RELIGIOUS DENOMINATION	n	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.
Roman Catholic	585	24.171	6.792	34.644	8.393	23.874	7.196	18.713	5.260	15.530	4.511
Methodist	44	26.500	7.235	37.455	9.439	25.886	6.641	21.091	4.927	16.341	3.858
Anglican	24	22.250	7.617	32.083	9.079	23.042	8.472	15.458	5.626	14.167	5.147
Government	103	24.117	6.302	36.117	7.373	22.971	6.665	18.272	5.338	14.767	4.117
Other	15	21.667	8.682	33.200	11.060	19.800	3.746	15.867	3.226	13.800	4.144

ONE-WAY ANOVA	df	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p
F-Test	4,766	2.265*	.0607*	2.518**	.0401**	2.577**	.0364**	5.838**	.0001**	2.092*	.0801*
Eta Squared		.0117		.0130		.0133		.0296		.0108	

* No significant difference at p = .05 level.
** Significant difference at p = .05 level.

A comparison of scores was made using **sex** as the independent variable. Females had significantly higher average scores on the English Language examination. Males had significantly higher scores in Social Studies. The scores of female and male REAP students were statistically the same at $p = .05$ in both Mathematics and Science (see Table 74). The linear and non-linear variance in these scores that was accounted for by the sex variable ranged from approximately 2.5 percent to less than 1 percent.

There were significant differences in the mean scores on English Language, Mathematics, and Social Studies, but not Science, when the **students' primary language** was used as the independent variable (see Table 75). REAP students whose primary language was Creole English had the highest mean score on the English Language BNSE examination, but Garifuna-speaking children had the highest averages in Mathematics, Social Studies, and Science. The Eta Squared statistics showed an explained variance of between approximately 1 and 2 percent for this independent variable.

TABLE 74: Mean Scores Of 771 REAP Students On 1984-85 Belize National Selection Examinations, by Sex, With F-Test and Eta Squared Values

		READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
SEX	n	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.
Male	380	23.557	6.903	34.266	8.527	23.955	7.620	19.476	5.365	15.655	4.641
Female	391	24.801	6.735	35.504	8.317	23.575	6.603	17.813	5.109	15.148	4.253

		READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
ONE-WAY ANOVA	df	F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p
F-Test	1,769	6.400**	.0116**	4.165**	.0416**	0.5481*	.4593*	19.433**	.0000**	2.503*	.1141*
Eta Squared		.0083		.0054		.0007		.0246		.0032	

* No significant difference at p = .05 level.
** Significant difference at p = .05 level.

TABLE 75: Mean Scores Of 771 REAP Students On 1984-85 Belize National Selection Examinations, by Student's Primary Language, With F-Test and Eta Squared Values

PRIMARY LANGUAGE	n	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.
Creole	257	25.249	7.289	36.350	8.916	24.020	7.164	18.381	5.121	15.459	4.305
Maya-Ketchi	85	22.859	6.911	33.365	8.655	21.988	7.328	18.741	5.174	15.612	4.938
Spanish	364	23.536	6.405	34.017	7.884	23.753	7.026	18.528	5.364	15.069	4.310
Garifuna	54	25.508	6.655	36.143	8.391	25.206	6.915	20.127	5.673	16.746	5.006

ONE-WAY ANOVA	df	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p
F-Test	3,767	6.027**	.0025**	5.342**	.0012**	2.753**	.0417**	1.930*	.1233*	2.684**	.0457**
Eta Squared		.0196		.0205		.0107		.0075		.0104	

* No significant difference at $p = .05$ level.
** Significant difference at $p = .05$ level.

REAP students' mean scores analyzed using **program maturity**, or **the number of years a school had been in REAP**, as the independent variable showed (see Table 76) students from schools in REAP the longest (nine years) had the highest mean scores on the English Language and Mathematics BNSE examinations. Students from schools in REAP five years had the highest average scores in Social Studies, and those from schools in REAP three years had the highest average scores in Science. Again, the Eta Squared statistic showed explained linear and non-linear variances on the four tests of between approximately 1 to 2 percent.

TABLE 76: Mean Scores Of 771 REAP Students On 1984-85 Belize National Selection Examinations, by Years In REAP (Program Maturity), With F-Test and Eta Squared Values

PROGRAM MATURITY	n	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.	MEAN	STD. DEV.
One Year	54	23.241	6.333	34.296	8.273	23.259	6.199	19.352	6.499	14.407	3.834
Two Years	215	23.591	6.284	34.121	7.969	23.595	7.252	18.056	5.204	14.800	4.139
Three Years	164	25.476	7.304	36.055	8.754	23.616	6.609	18.750	5.073	16.439	4.493
Four Years	79	22.962	6.593	34.519	8.008	24.165	6.631	18.671	4.898	14.076	4.057
Five Years	28	23.036	4.895	31.893	6.448	20.964	4.955	19.714	5.346	15.893	4.557
Six Years	135	24.222	6.819	34.719	8.528	23.185	6.796	18.748	4.709	15.430	4.353
Nine Years	96	25.156	7.860	36.406	9.401	25.969	8.931	18.813	6.191	16.417	5.227

ONE-WAY ANOVA	df	READING COMP.		ENG. LANGUAGE		MATHEMATICS		SOCIAL STUDIES		SCIENCE	
		F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p	F-VALUE	p
F-Test	6,764	2.313**	.0321**	2.019*	.061*	2.554**	.0187**	0.885*	.491*	4.779**	.0001**
Eta Squared		.0178		.0156		.0197		.0007		.0362	

* No significant difference at p = .05 level.
** Significant difference at p = .05 level.

The use of the Eta Squared statistic measured the linear and non-linear variance in the dependent variable (BNSE test scores of REAP students) accounted for by the independent variable used in the bivariate One Way ANOVA procedure. To analyze the amount of variance in the dependent variables accounted for by the independent variables acting jointly, a multivariate analysis was conducted.

Of the various multiple regression analysis models available, the Standard Regression Model was selected because it was assumed that the independent variables did not have a causal relationship with the dependent variables. The independent variables utilized in the REAP Program/School Evaluation and the independent variables used in the analysis of academic achievement were divided into student-related and school-related variables. The order of their inclusion was determined by the SPSS Regression sub-program in two separate analyses as follows:

Student-Related Independent Variables:

Sex

Primary Language

School-Level Independent Variables:

Size of School Enrollment

Number of Years School in REAP (Program Maturity)

District Where School is Located

Quality of the REAP School Principal

Overall REAP Program Quality per School

Religious Denomination of School Management

Quality of REAP Teachers

Quality of REAP Parent/Community Participation

Quality of REAP Impact on the Community

Quality of the REAP Curricular/Instructional Program

Quality of the REAP Administrative Program

Quality of the REAP Agricultural Program

As seen in Table 77, the student-related sex and primary language independent variables, acting jointly, accounted for 1.2 percent of the variance in linear regression (R^2, Full Model) of the scores on the English Language examination, 2.7 percent on the Social Studies examination, and less than one percent on both the Mathematics and Science examinations.

The school-related independent variables (see Table 78, R^2, Full Model) accounted for 28.8 percent of the variance in linear regression in the English Language examination, 29.8 percent in Mathematics, 22.9 percent in Social Studies, and 22.5 percent in the Science exam.

TABLE 77: Summary of the Standard Regression Analysis On The 1984-85 Belize National Selection Examination Scores of 771 REAP Students, By Student-Related Variables

INDEPENDENT VARIABLES	BELIZE NATIONAL SELECTION EXAMINATION											
	ENGLISH LANGUAGE			MATHEMATICS			SOCIAL STUDIES			SCIENCE		
	df	R^2	F	df	R^2	F	df	R^2	F	df	R^2	F
Sex	1	.005	4.026**	1	.001	.533*	1	.025	19.233***	1	.003	2.486*
Primary Language	1	.012	4.711**	1	.001	.319*	1	.027	1.854*	1	.003	0.049*
Full Model	**2**	**.012**	**4.448*** **	2	.001	.433*	2	.027	10.655***	2	.003	1.274*
Residual	**768**	**.988**	--	768	.999	--	768	.973	--	768	.997	--

* p = .05; No significant difference.
** p = .05; Significant difference.
*** p = .01; Significant difference.

TABLE 78: Summary of the Standard Regression Analysis On Fifty-Four School-Level Averages of the 1984-85 Belize National Selection Examination Scores of REAP Students, By School-Related Variables

	BELIZE NATIONAL SELECTION EXAMINATION											
	ENGLISH LANGUAGE			MATHEMATICS			SOCIAL STUDIES			SCIENCE		
INDEPENDENT VARIABLES	df	R^2	F	df	R^2	F	df	R^2	F	df	R^2	F
Size of School Population	1	.000	.105*	1	.071	.023*	1	.019	.003*	1	.003	.105*
Number of Years School In REAP	1	.007	.041*	1	.082	.128*	1	.019	.130*	1	.025	.073*
District of School	1	.120	7.984*	1	.100	.519*	1	.122	3.815*	1	.043	3.584*
Quality of REAP School Principals	1	.121	1.981*	1	.125	.233*	1	.122	.479*	1	.047	.114*
Overall REAP Program Quality	1	.121	2.655*	1	.140	.011*	1	.127	.226*	1	.054	.952*
Religious Denom. of School Mgt.	1	.127	.279*	1	.163	3.710*	1	.135	1.199*	1	.075	2.765*
Quality of REAP Teachers	1	.197	.367*	1	.262	.957*	1	.160	.058*	1	.136	.030*
Quality of REAP Parent/ Com. Part.	1	.209	.495*	1	.275	.395*	1	.191	.314*	1	.149	3.616*

continued on next page

TABLE 78: Summary of the Standard Regression Analysis On Fifty-Four School-Level Averages of the 1984-85 Belize National Selection Examination Scores of REAP Students, By School-Related Variables

Continued

	BELIZE NATIONAL SELECTION EXAMINATION											
	ENGLISH LANGUAGE			MATHEMATICS			SOCIAL STUDIES			SCIENCE		
INDEPENDENT VARIABLES	df	R^2	F	df	R^2	F	df	R^2	F	df	R^2	F
Quality of REAP Impact On Community	1	2.10	.171*	1	.278	.296*	1	.191	.021*	1	.164	1.061*
Quality of REAP Curric./ Instr. Prog.	1	.244	1.669*	1	.278	.085*	1	.202	1.087*	1	.218	2.787*
Quality of REAP Admin. Prog.	1	.248	.415*	1	.297	1.052*	1	2.17	.662*	1	.218	.000*
Quality of REAP Agric. Program	1	.288	2.264*	1	.298	.046*	1	.229	.652*	1	.225	.377*
FULL MODEL	**12**	**.288**	**1.383***	**12**	**.298**	**1.447***	**12**	**.229**	**1.016***	**12**	**.225**	**.993***
RESIDUAL	**41**	**.712**	--	**41**	**.702**	--	**41**	**.771**	--	**41**	**.775**	--

* p = .05; No significant difference.
** p = .05; Significant difference.
*** p = .01; Significant difference.

5.0 EVALUATION OF REAP-RELATED STUDENT ACHIEVEMENT

5.1 Proposed Methodology for Evaluating REAP-Related Student Achievement

As described in a previous section (3.3.2), the REAP curriculum was intended to teach subjects in the traditional curriculum, reinforce subjects in the traditional curriculum, and teach subjects not found in the traditional curriculum. Those subjects not found in the traditional curriculum are covered by the ten REAP Areas of Study: Soils, Plants, Animals, Agricultural Practices, Weather, Land and Water, Community Study, Health and Nutrition, Ecology, and Career Education. These ten areas contained the knowledge and skills that were to be evaluated as REAP-Related student achievement.

5.2 REAP Knowledge Test

REAP-related knowledge was to have been measured directly by a multiple choice, survey type test, which would evaluate students' mastery of the knowledge objectives found in the REAP Learning Activity Packs (REAP/LAPs). A group of experienced REAP resource teachers met on several occassions to develop and revise REAP Knowledge Test items. The REAP Knowledge Test was to have been compiled, tested for validity and reliability, and conducted in the same way that the BNSE tests are administered. The field trial version of the REAP Knowledge Test was supposed to be given as an in-school examination to all REAP Std. VI (eighth grade) students during the last term of the 1984-85 school year. It was to serve the dual purposes of testing the students' REAP-related knowledge and diffusing the idea of such a test.

A variety of problems delayed the preparation of the REAP Knowledge Test. Because of delays, it was not field-tested and the final version that was sent out was invalid. No other direct measure of REAP-related knowledge was available.

5.3 REAP Skills Test

REAP-related skills, such as raising rabbits or chickens, building a garden fence, etc., were to be measured by competency-based checklists based upon the skills required in selected REAP/LAPs. REAP resource teachers and the CARE/REAP agricultural specialist developed thirteen checklists. However, the REAP Skills Checklists also were not completed until late in the 1984-85 school year.

To begin the diffusion process and get REAP principals and teachers accustomed to the idea of testing students' observable behavior, the checklists were given to REAP principals and teachers during May, 1985. They were asked to make retrospective judgements about how many of their students had demonstrated mastery of the REAP skills during the past year. This invalidated the competency-based nature of the checklists. Data was received on 665 REAP students reporting either knowledge or skill data; 272 students, or 41 percent of REAP students, did not have any REAP Skills Test data included in the report. The highly questionable REAP Skill Test data for 393 students is found in Table 79.

TABLE 79: REAP Teacher Perceptions of the Number of REAP-Related Skills Mastered by 393 REAP Students, by Number of Skills, Number of Students, Percentage and Cumulative Percentage

NUMBER OF SKILLS	NUMBER OF STUDENTS	PERCENT	CUMU. PERCENT
1	50	12.7	12.7
2	57	14.5	27.2
3	69	17.6	44.8
4	58	14.8	59.6
5	59	15.0	74.6
6	18	4.6	79.2
7	36	9.2	88.4
8	7	1.8	90.2
9	9	2.3	92.5
10	10	2.5	95.0
11	14	3.6	98.6
12	6	1.5	100.1

5.4 REAP Agricultural Production

Agricultural production in REAP was seen as a vehicle for teaching and reinforcing aspects of the traditional curriculum, as well as an end in itself. While assisting children to learn academic subjects, the project's founders hoped that sutdents could be taught modern techniques for agriculture that would increase the supply of fresh, nutritious, local foods and decrease the dependency on imported food.

Modern agriculture was not defined to mean mechanized agriculture. It was defined as the use of inexpensive, appropriate agricultural technology, which would allow the small farmer to produce more and better foods for home and local consumption, and perhaps, for other than local markets.

Profits generated by agricultural production at the REAP schools have been used for a variety of purposes. A major use has been the replacement of REAP tools and supplies, including funds for future crop production. Heifer Project International provided a modest rotating loan fund (approximately $2,000 U.S.), with CARE and Rotary International contributing most of the initial funds for the tools, equipment, and supplies.

The end-of-term reports submitted to the REAP staff contained most of the agricultural production information for 1984-85 (see Table 80) in 55 REAP rural primary schools and the Belize School of Education. During that year the primary schools averaged approximately 177 pounds of vegetables and other crops, 26 broiler chickens

raised, and 60 pounds of honey. Average yearly figures are misleading because they include the small production, if any, of schools in REAP for the first year, during which time the garden, coops, etc. are being constructed.

TABLE 80: Agricultural Production At REAP Primary Schools and the Belize School of Education (BSE) During the 1984-85 School Year, By School Terms and School Categories

TERM/SCHOOL	NO. OF SCHOOLS	VEGETABLES/ PLANT CROPS IN POUNDS	GARDEN AREA IN ACRES	POULTRY IN LBS.*	HONEY IN LBS.	VALUE IN $BZE**
First Term/REAP	55	1,369	7.8	1,156	409	3,303.25
Second Term/REAP	55	5,042	9.1	2,152	666	7,324.50
Third Term/REAP	55	3,308	7.2	2,452	2,173	8,187.75
All Year/BSE	1	--	0.25	800	180	1,735.00
AV/YR./ALL REAP	**55/1**	**9,719**	**8.25**	**6,560**	**3,428**	**20,550.50**

* @ 4 lbs./Chicken; 1,156 lbs. = 289 chickens; 2,156 = 538; 2,172 = 543

** 2$BZE = 1$US; Veg. @ $0.50 BZE; Honey @ $0.75 BZE; Poultry @ $2.00 BZE

The schools in 1984-85 had an average gross income from agricultural production of approximately $351.00 BZE (2 $BZE = 1$ U.S.) and an average net profit of $150-200. The REAP program at BSE produced enough profit in poultry and honey to pay all of the program's operating costs and two field trips for the BSE/REAP students.

Agricultural production for the past seven years has been modest, but has provided sufficient opportunity to present students with hands-on instruction in gardening, raising poultry and more recently, in beekeeping. A modest income has also allowed the

schools to replace or purchase items that would not have been otherwise available. Table 81 details the almost 18 tons of vegetable and plant crops, close to thirty-thousand pounds of poultry, and over five-thousand pounds of honey produced at the schools in the seven-year period.

There was a decrease in agricultural production from the 1978-79 school year through the 1981-82 school year (see Table 82). As REAP matured, the size of gardens and numbers of crops of poultry were reduced in size. These were two reasons for this: first, it was not necessary to have a large production-oriented garden or chicken raising project to accomplish the REAP instructional objectives; second, the supplier-to-school delivery of agricultural supplies by Heifer Project International was phased-out, forcing the schools to look for local suppliers, and decreasing the REAP schools' production.

The increase in agricultural production, per school, beginning with the 1982-83 school year, may be attributable to three factors. CARE/REAP added a full-time professional agriculturalist and full-time professional nutritionist, as well as two technician-level agricultural extensionists to assist Belizeans provide inservice training and technical assistance to REAP school staffs. Rotary International and the local Rotary Clubs of Belize provided material assistance, along with CARE's and the Ministry of Education's help, to encourage the agricultural aspects of REAP. Finally, the REAP District Councils began facilitating the problems of agricultural supplies.

TABLE 81: Agricultural Production[h] At Rural REAP Primary Schools and the Belize School of Education (BSE), From 1978-79 School Year, Through the 1984-85 School Year, by Year and School Category

SCHOOL YEAR/ SCHOOL CATEGORY	NO. OF SCHOOLS	VEGETABLES/PLANT CROPS IN LBS.	GARDEN AREA IN ACRES[a]	POULTRY IN LBS.[b]	HONEY IN LBS.	VALUE $BZE[c]
1978-79						
REAP-PRIMARY	8	3,137	3.05	2,992	--	7,552.50
REAP-BSE	1	--	--	--	--	--
1979-80						
REAP-PRIMARY	14	5,338[d]	10.38	2,112	--	5,893.00
REAP-BSE	1	--	--	980	10	1,767.50
1980-81						
REAP-PRIMARY	16	2,567	10.76	3,292	--	7,867.50
REAP-BSE	1	--	--	500	88	1,066.00
1981-82						
REAP-PRIMARY	23	2,727	4.77	2,680	--	6,723.50
REAP-BSE	1	200	--	500	588[e]	1,815.00
1982-83						
REAP-PRIMARY	32[f]	3,444	9.09	5,072	192.5	12,010.38
REAP-BSE	1	--[g]	--[g]	--[g]	--[g]	--[g]
1983-84						
REAP-PRIMARY	50	8,619	12.76	4,852	10.36	14,790.00
REAP-BSE	1	--[g]	--[g]	--[g]	--[g]	--[g]
1984-85						
REAP-PRIMARY	55	9,719		5,760	3,248	18,815.50
REAP-BSE	1	--	8.25[a]	800	180	1,735.00
1979-85 ALL REAP	**56**	**35,751**	**7.44**	**29,540**	**5,262.5**	**81,036.88**

a includes BSE garden area
b poultry figures for previous years converted @ 4 lbs/bird, undressed
c all value expressed in current (9/85) values
d NO DATA for 70 recorded harvests; production estimated @ 50% of 1978-79/acre x 1979-80 area; 514.26 lbs./acre x 10.38
e gallons of honey x 16 lbs./gallon
f 5 rural REAP schools did not report Ag. production data in 1982-83
g BSE data not reported in useable form
h approximately: 30 different plant crops; 200 rabbits, dairy goats, and lab animals also raised

TABLE 82: Average Yearly Agricultural Production At Rural REAP Primary Schools From 1978-79 School Year Through the 1984-85 Year

SCHOOL YEAR	NO. OF SCHOOLS	VEGETABLES/ PLANT CROPS IN POUNDS PER SCHOOL	GARDEN AREA IN ACRES PER SCH	POULTRY IN LBS. PER SCH	HONEY IN LBS. PER SCH	VALUE IN $BZE PER SCH
1978-79	8	392	0.38	374	--	944
1979-80	14	381	0.74	151	--	492
1980-81	16	160	0.67	206	--	492
1981-82	23	119	0.21	117	--	292
1982-83	*32	108	0.28	159	6	375
1983-84	50	172	0.26	97	21	296
1984-85	55	177	0.15	105	60	342

* 5 schools did not report ag. production data in 1982-83

Approximately twenty-eight Peace Corps Volunteers have worked with REAP as "Garden Assistants" in the rural schools, as REAP/ Lecturers of the Belize School of Education (until 1984-85 when an ex-REAP teacher and principal became the first Belizean REAP/BSE Lecturer), and more recently as curriculum assistants. Peace Corps Volunteers' contributions have been mixed, individually, but significant overall in establishing and maintaining the agricultural component of REAP. One Volunteer founded an agriculturally-oriented Junior Secondary (Jr. High) School which began instruction with 23-out-of-24 students who were former REAP school leavers (graduates).

The agricultural production at the REAP schools provides evidence of continuing successful instruction in new REAP agricultural

knowledge and skills. It does not, however, provide evidence of individual acquisition of knowledge and skills, nor does it give any clear picture as to the degree to which the knowledge and skills are being acquired by the REAP students. Hopefully, valid REAP knowledge and skills tests will provide such documentation.

6.0 A COMPARATIVE ANALYSIS OF REAP

6.1 Theories of Development

The following brief descriptions of selected theories of development were taken from the excellent book, Education and National Development: A Comparative Perspective (Fagerlind and Saha, 1983). Four theories of development were chosen as relevant for a comparative analysis of REAP: Modernization Theory, Human Capital Theory, Liberation Theory, and Dependency Theory.

6.1.1 Modernization Theory can " . . . be characterized as revolutionary, (a dramatic shift from tradition to modern), complex (multiple causes), systematic, global (affecting all societies), phased (advance through stages), homogenizing (convergence), irreversible and progressive." There is an assumption in the Modernization Theory of Development, unproven by research, that " . . . there is a direct casual link between modernizing institutions, modern values, modern behavior, modern society, and economic development."

The Belizeans who conceptualized REAP wanted the system of primary education to assist the process of modernizing

Belizean institutions, values, behaviors, and society, so that young people could better meet their own needs and those of the nation. However, modernization was viewed as a means to an end, and not an end in itself. They did not want to copy the school systems of the United States or the United Kingdom, or any other technologically advanced country. They had already inherited one colonial system of education.

The REAP founders wanted to modernize certain aspects of their children's values, behaviors, institutions, and society, but preserve others. Community study was included in REAP to support and preserve the best of rural life, through better understanding. Appropriate technology was stressed to make changes in agricultural techniques that would have a real chance of lasting beyond the "project". Traditional academic subjects were not discarded, but supplemented and supported by the REAP curriculum and instructional methods.

Belizean educators did not believe that modernization must replace traditionalism. REAP is an attempt at balancing traditionalism and modernism in education, extracting the best of each and discarding the obvious flaws in each. The last five items on the school/program evaluation gave some indication of the modernizing influence of REAP. Except for the continued achievement of REAP students in the traditional tests of academic achievement (BNSE), no data were collected on the influence of REAP in preserving other aspects of the traditional culture.

6.1.2 Human Capital Theory views the improvement of human capacities as basic components of economic development . . . "It postulates that the most efficient path to the national development of any society lies in the improvement of its population, that is, its human capital. . . . Its appeal was based upon the presumed economic return of investment in education, both at the macro and micro levels."

Belizeans who developed and implemented REAP would agree with some of the general principles of Human Capital Theory, such as a general link between primary education and development. However, these same Belizeans often expressed the opinion that the traditional primary education was not meeting the developmental needs of the youth who, by circumstance or choice, didn't continue their educations after Std. VI (eighth grade) and remained in the rural areas. The traditional primary school curriculum was viewed as part of the problem of rural underemployment, malnutrition, and out-migration.

REAP is an attempt to convert the system of primary education into a real force in economic development. It is an attempt to ameliorate the problem of rural underemployment by giving youth new and better tools to forge a better economic solution for themselves. Malnutrition and unhealthful practices in villages are confronted in REAP by goals of local self-sufficiency in fresh and nutritious foods and a cleaner, more healthful environment. Rural out-migration is amelio-

rated by REAP programs that Belizeans hope will, together with other programs, make the rural areas more reasonable alternatives to life in the cities or abroad.

Agricultural production at REAP schools indicates a modest influence on the local village economy by REAP. The REAP/GROWTH (Gaining a Realistic Orientation to Work, Training, and Help) pilot project sponsored by the Government of Belize and CARE is a more direct attempt to make REAP a force in economic development. It proposes to take REAP school leavers (graduates) and give them experience in working as small entrepreneurs or for others, provide them with more advanced training, and make small start-up loans available to them through a revolving fund. In this aspect, REAP/GROWTH are clearly related to Human Capital Theories of development.

6.1.3 Liberation Theory is closely related to classical Marxist thought on the class struggle and assumes that " . . . nothing good or profitable can be secured for the poor members of an underdeveloped society without a drastic and radical change in the structure of society . . . (because the poor) . . . are oppressed by the powerholders of their own societies, who control the relevant economic resources such as land, industry, and wealth."

Few nations have initiated such basic and sweeping revisions of their primary school systems as Belize has with REAP, without a major social or political upheaval to fuel the movement towards change. This may be due to some of the

striking differences between Belize and other developing nations: where Belize is land-rich, many countries are land-poor; where Belize is underpopulated, many nations are bursting at the seams with people; where its neighbors have long-entrenched social class oligarchies, Belize enjoys relatively less disparaties.

Whether or not REAP will succeed in having the far-reaching, long-lasting effects on rural life visualized by its founders, the present level of participation by community and government leaders indicates a real desire to see the living standards of the rural population raised significantly. A separate but related question is how REAP will be received and supported in the towns and cities, and whether it will make any significant progress in ameliorating distinctly urban problems.

6.1.4 Dependency Theory assumes that " . . . development and underdevelopment as relational concepts within and between societies are inversely related. The underdevelopment of a region or a society is seen as a process which is linked to the development of another region or an outside society . . . It rejects the linear and progressive view of development and places importance of factors external to the society . . . dependency theory focuses on the process whereby the conditions of the less developed regions and countries of the world are seen to be caused by the activities of rich coun-

tries. The process whereby the metropolis dominates the countryside within a country is identical to that which occurs between countries."

Belizeans are acutely aware of their dependence on more technologically developed countries. Belize depends on the United Kingdom (UK) for protection from its acquisitive neighbor, Guatemala. It depends on the U.K., the U.S., and Mexico for almost all of its manufactured consumer goods, for everything from a pin to a deep water port. And it depends upon outside sources for a large portion of its food.

REAP was, to an extent, a reaction against this state of dependency. The move to produce and consume fresh, local foods advocated by REAP/GROWTH is an attempt to lessen the present degree of dependency. REAP was a part of a broader macro-economic decision to use the primary economic advantage that Belize has, plentiful arable land. Belizeans believe that they can become self-sufficient in food and even develop into an important exporter of agricultural products to their neighbors. Economic interdependence, and not dependence is the goal of the Government of Belize and REAP/GROWTH.

REAP does not fit neatly into any of the aforementioned general theories of development, but does display certain aspects of Modernization and Human Capital Theory. This is most probably due to the fact that it was conceptualized without reference to an overriding philosophical position. REAP is eclectic and pragmatic, rather than dogmatic.

6.2 Educational Models

It is equally difficult to find a clear-cut educational model that fits REAP. One comparable program in the U.S. would be the prevocational training commonly offered during the sixth, seventh, and eighth grades (Stds. IV-VI), where students are given an opportunity to explore various occupations. Another might be career education, usually begun at the same Junior High School/Middle School level, which involves the entire community as a learning resource and culminates in some useable skill.

Because the REAP school leavers (graduates) not continuing their educations needed immediately useable knowledge and skills, the career education continuum, which may span the kindergarten to adult years, was collapsed into a three-year REAP sequence of exploratory, developmental, and consolidatory learning in Stds. IV, V, and VI. It may be that the follow-on REAP/GROWTH project will be able to assist the Government of Belize to establish additional institutionalized experiences to expand and continue the career education of REAP school leavers.

REAP also does not follow the pattern of "similar" types of projects in other developing countries in several key points:

1. Unlike socialist Cuba, REAP does not divide the school day into work and study periods, where the student studies for their own benefit (and that of the state) during one part of the day, and then works for the benefit of the state during another part of the day.

2. Unlike many educational programs in developing countries that have as their aim the training of agriculturalists, REAP's goal is to educate students equally in both academics and practical learning.

3. Unlike special schools in developing countries where students are presented with traditional academics and agricultural education separately, REAP attempts to erase the compartmentalization of the academic and practical, by making academic learning practical.

4. Unlike isolated schools, REAP is an educational methodology for all Belizean primary education, all rural schools and, eventually, all urban schools as well. It is GOB policy that REAP will become the primary school curriculum.

7.0 SUMMARY, CONCLUSIONS, AND IMPLICATIONS

The Relevant Education for Agriculture and Production (REAP) 1984-85 formative evaluation was composed of three parts: an evaluation of the REAP program at the school level; an evaluation of academic achievement by REAP and Non-REAP students; and an evaluation of REAP-related knowledge and skills.

7.1 Summary and Conclusions of the REAP Program/School Evaluation

The REAP program/school evaluation was conducted on 54 rural primary schools to determine the degree to which the program's process objectives were being met. Forty-three questionnaire items were developed by the REAP staff members and weighted according to their importance. A four-point, forced-choice scale (1 = low; 4 = high) was used. Five different categories of people acted as raters, with 53 of the 54 REAP schools evaluated by one-or-more raters. The eight program quality sub-variables evaluated were as follows:

REAP **school-level administration** received the highest weighted mean percentage quality rating (74.1 percent) of all eight sub-variables, and had the third strongest relationship (Pearson Product Correlation Coefficient, r = .7668) to overall REAP program quality. Returning reports received a relatively high 3.30 average raw score out of a possible 4.0 points, with maintenance of tools and equipment (3.14) and coordinating or participating in REAP-related events (3.06) almost as strong. Keeping bank accounts according to REAP

procedures received an average raw score rating of 2.35 and should cause some concern at the district and national administrative levels of REAP.

The REAP **curriculum and instructional program** in the 54 schools had the second highest weighted mean percentage quality rating (68.8 percent) of the eight sub-variables, as well as the second strongest relationship (Pearson Product Correlation Coefficient, r = .7777) to overall REAP program quality. The nine items that constituted the measure of curriculum/instructional program quality had an average raw score (out of possible 4.0) of 2.72. However, with the removal of an item dealing with the use of criterion-referenced testing and the skills test, for which there had been no inservice training, the average score for the eight remaining items went up slightly to 2.76. The lowest rated (2.23) was the use of the Learning Activity Packs (REAP/LAPs) which indicated a strong need for district-level and school-level inservice training on the use of REAP/LAPs.

The **quality of REAP principals** was given the third highest weighted mean percentage quality rating (66.2 percent) and had a fairly strong relationship (Pearson Product Correlation Coefficient, r = .6500) with overall REAP program quality, albeit only the seventh strongest out of eight correlated quality sub-variables. The five items in the principal quality sub-variable had an average raw score of 2.54 (out of 4.0). However, when the item dealing with principals' attendance at the Belize School of Education's REAP program, which didn't exist when many of the principals went to BSE, was deleted, the average raw score jumped to 2.74. A strong point in the evaluation of REAP principal quality was the relatively high

score (3.17) recorded for principals' attendance at the REAP District Council meetings, a crucial point for the program's proper coordination.

REAP **teacher quality** received the fifth highest weighted mean percentage quality rating (58.4 percent) and had the weakest relationship with the overall program quality ratings (Pearson Product Correlation Coefficient, r = .4586) of the eight sub-variables. Relatively low scores for the four items comprising the teacher quality sub-variable resulted in an average raw score of 2.34. Recent developments may lead to more and better inservice training at the district and school levels.

The **staff inservice quality** sub-variable received the fifth highest weighted mean percentage (62.2 percent) of the eight sub-variables and had the fifth strongest relationship (Pearson Product Correlation Coefficient, r = .6538) to overall program quality. The six questionnaire items comprising this sub-variable had an average raw score of 2.49, slightly below the all-item average of 2.51. Attendance by teachers at the Health and Nutrition Inservice Training was rated lowest (2.30) among these items.

Agricultural program quality received the fourth highest weighted mean percentage quality rating (65.0), but had the highest Pearson Product Correlation Coefficient (r = .7832) of any of the eight quality sub-variables. The average raw score of the eleven items comprising this sub-variable was 2.52, slightly above the national average for all 43 questionnaire items. The maintenance of REAP facilities was rated higher (3.39 out of 4.0) than any other item on the questionnaire. Poultry raising received a relatively

low mean raw score of 1.83, which reflects the difficulty of acquiring chicks and supplies. The lowest average score of the agricultural items was given to projects by REAP school leavers (graduates), anticipated because of a previous study indicating the need for technical and financial support for such individual undertakings. Rates received for adequate land (2.49) and adequate water (2.56) are somewhat pre-determined by the schools' locations. The moderately low mean score for adequate fencing (2.40), influenced somewhat by the presence of new schools in the population, should cause some concern.

The **quality of parent-community participation** received the lowest weighted mean percentage rating (47.6) of the eight variables, but this could be a function of the scale definitions used in the four items comprising this sub-variable. The Pearson Product Correlation Coefficient for parent-community participation (r = .7197) was fourth highest in strength in relation to overall program quality. The average raw score was a relatively low 1.89, when compared to the all-item average of 2.51.

The quality of **REAP's impact on the communities** surrounding the schools had the sixth highest weighted mean percentage (61.2), as well as the sixth strongest relationship to overall program quality (Pearson Product Correlation Coefficient, r = .6525). The average raw score for the six items in this sub-variable was 2.36.

From the data presented in the program/school evaluation, and from discussions with REAP principals, teachers, and staff, the following general conclusion were reached concerning the level of implementation of the program during the period of the evaluation:

-- **Implementation of the REAP program in the 54 rural schools studied has been generally successful, but is incomplete.** Areas where additional development/implementation is required include: the inservice training received by the principals and teachers, both technical and in the new REAP teaching methods; the use of REAP/LAPs and competency-based instruction and testing; the provision of agricultural supplies for the schools and a follow-up program, like the pilot REAP/GROWTH project, for school leavers; an administrative manual to specify project procedures; and, a planned method for including more parents and community members in REAP activities, so as to increase their assistance to REAP and the impact of REAP on the community.

-- **The quality of the REAP program varies within and between districts.** Continuing, data-based formative evaluation will be necessary to provide decision makers the best information with which to make short-term improvements and long-term plans.

-- **The Government of Belize (GOB) will need to continue the process of simultaneous development, implementation, and evaluation in the existing REAP schools, while expanding the program to the remaining rural and urban schools without REAP.** This will require the designation of existing GOB resources to continue the process. It will also require the assistance of other organizations or governments to provide the start-up capital that was formerly provided by CARE, Heifer Project

International, and Rotary International. However, because of the successful development of REAP to date, the nature and amount of this external assistance should be substantially different than during the first nine years of REAP.

7.2 Summary and Conclusion of the Evaluation of Academic Student Achievement

The evaluation of academic student achievement was divided into two parts. First, REAP and NON-REAP students were compared using five scores of the 1984-85 Belize National Selection Examinations (BNSE) to see if there were significant differences. Next, the scores of REAP students on the same BNSE examinations were analyzed to determine the amount of variation within their scores that could be accounted for by selected independent variables. The entire population of students from rural schools who took the BNSE (771 REAP and 584 NON-REAP) were included in the evaluation.

The one-way analysis of variance (ANOVA), with F-tests of the population means, and t-tests were applied to the scores of 771 REAP and 584 NON-REAP students. Results indicated that there were no significant differences between the population mean scores of REAP and NON-REAP students at the $p = .05$ level in Reading Comprehension, English Language, Mathematics, Social Studies, and Science. After elimination of 269 REAP students that had received less than the complete three-year REAP program, the scores of the 502 remaining REAP and 584 NON-REAP students were again analyzed using the same statistical procedures. The outcome indicated that the population mean score of the REAP students on the Science examination was

significantly higher, at $p = .05$, than the mean score of NON-REAP students, but no significant differences were found between the mean scores of REAP and NON-REAP students in Reading Comprehension, English Language, Mathematics, and Social Studies. These findings were consistent with similar analyses of BNSE results over the past seven years, in which REAP students never scored significantly lower than NON-REAP students in twenty-five BNSE examinations, and scored significantly higher than NON-REAP students (at $p = .05$) on ten of the twenty-five examinations.

The Eta Squared statistic, which was used to indicate the amount of linear and non-linear variation in the dependent variables (BNSE tests) accounted for by the independent variable (REAP/NON-REAP) showed that less than 1 percent of the differences between the mean scores of the REAP and NON-REAP students was accounted for by REAP affiliation.

After comparing REAP and NON-REAP student achievement, the scores of all 771 REAP students were analyzed using the one-way ANOVA bivariate analysis with F-tests of population means.

Reading scores of the 771 REAP students were analyzed in several ways. The Pearson Product Correlation Coefficients that were calculated between the Reading Comprehension scores and the other BNSE test scores showed a very high correlation with English Language ($r = .938$), with coefficients for the other BNSE tests ranging from .516 to .588 at $p = .000$. The one-way ANOVA of REAP student Reading Comprehension scores indicated significant differences between the mean scores of the sub-groups (levels) of the independent variables at $p = .05$ level, for the District the school

was in, the total size of the school enrollment, sex, the student's primary language, and the number of years the school had been in REAP, but not for the religious denomination (management) variable.

A one-way ANOVA of the English Language, Mathematics, Social Studies, and Science test scores of the REAP students showed significant differences at the $p = .05$ level, between sub-groups (levels) of the District, School Size, Religious Denomination (management), Sex, Primary Language, and Program Maturity independent variables. The Eta Squared statistic indicated a range of linear and non-linear variation in the dependent variables (BNSEs) accounted for by the aforementioned independent variables of from less than 1 percent to 3 percent.

To establish the amount of variation in the BNSE tests accounted for by the independent variables acting jointly, two standard, multiple regression analyses were conducted. The first, utilizing the student-related sex and primary language independent variables, showed Full Model R^2 relationships which jointly accounted for from .001 to 2.7 percent of the variance in linear regression in the English Language, Social Studies, Mathematics, and Science BNSE examinations.

The second standard, multiple regression analysis utilizied school-level mean scores on the same four BNSE examinations. The District, School Size, and Program Maturity school-level independent variables, plus nine program quality independent variables were used. The amount of variation in linear regression accounted for by these twelve school-related independent variables, acting jointly, as measured by the Full Model R^2 statistic, was 28.8 percent on the

English Language examination, 29.9 percent on Mathematics, 22.9 percent on Social Studies, and 22.5 percent on the Science examination.

The residuals, or portions of the variance in linear regression not explained in the latter analysis ranged from 71.2 to 77.5 percent. This indicates that the factors which account for most of the variation (differences) between the scores of the sub-groups of the independent variables were not included in the present analysis.

The conclusion that may be drawn is that **REAP students can participate in REAP without any loss in academic achievement, and may even increase their academic achievement while participating in REAP. They definitely do not do worse than their counterparts who are not in REAP and study the traditional curriculum, in the traditional manner.**

The implications of this finding for Belize are significant. Students in REAP rural primary schools are involved in outdoor practical learning activities, such as gardening, raising poultry, and/or beekeeping an average of from 3 to 5 hours per week. In a ten-month school year that would total approximately 120-200 hours per year. Over the normal three-year REAP curriculum this would equal about 360-600 hours of time that Standard VI REAP students had not spent studying the traditional subjects in a traditional instructional framework. Yet, in all comparisons of the BNSE test results to date, the REAP students did just as well academically,

and sometimes better, than the NON-REAP students who, supposedly, spent those 360-600 hours repeating their lessons through rote memorization and copy drills.

The reason(s) why REAP students can spend less time on academic subjects than NON-REAP students, yet do just as well or better on academic tests, remains unclear. It may be that continued evaluation of test scores might shed more light on this apparent anomaly. However, for the purpose of the formative evaluation, **nothing was found that should reduce the confidence of the Government of Belize in expanding the REAP program into the remaining rural primary schools. As long as REAP students continue to match the NON-REAP students in their academic accomplishments, it appears that students have much to gain and nothing to lose academically by participation in REAP.**

The implications for other developing countries are also significant. Given local adaptation of the REAP model, and similar support by governments and international agencies over a similar period of time, the REAP model may offer a way to infuse practical learning into the primary school curriculum and, at the same time, at least maintain levels of academic achievement. There is no reason to believe that the subject of the practical learning must be gardening, beekeeping, or poultry raising, as was the case in REAP in Belize. The REAP Areas of Study afford a considerable amount of flexibility in the content and could include many different techniques of agriculture, reforestation, or practice in building an agricultural infrastructure, such as cooperatives or individual marketing.

7.3 Summary and Conclusions on the Evaluation of REAP-Related Student Achievement

REAP-related student achievement was defined as the knowledge and skills contained in the ten REAP Areas of Study and not taught in the traditional curriculum. REAP knowledge was to have been tested by a validated, multiple choice test based upon knowledge objectives contained in the REAP/LAPs. REAP skills were to have been evaluated by use of skill checklists and competency-based testing procedures. Dubious results were received on the REAP skills test; the REAP knowledge test was invalid.

Indirect evidence of student acquisition of REAP related knowledge and skills in agricultural practices was presented in the form of agricultural production records. A total of 9,719 pounds of mixed crops and vegetables, 6,560 pounds of poultry, and 3,428 pounds of honey were produced by REAP students and student teachers during the 1984-85 school year. In seven years partial records indicate an approximate production of 18 tons of vegetables, thirty thousand pounds of poultry, and five thousand pounds of honey in the REAP program. This has provided a modest yearly income for the schools to be used in the REAP program, and has provided modest increases of fresh food for local consumers.

A major factor in agricultural production has been the assistance of Belizean agencies, CARE, Heifer Project International, Rotary International, and the U.S. Peace Corps Volunteers who have worked in REAP.

APPENDIX-A - Relevant Education for Agriculture and Production (REAP) - Format of Statements for Program Evaluation

1 **DEFINE PROBLEM** in terms of undesirable condition(s) in the rural educational environment, the rural teacher, and/or the rural primary school student.

2 **STATE LIMITING CONDITIONS** related to the specified problems in the rural educational environment, the rural teachers, and/or the rural primary school student.

3 **STATE GOALS** in terms of specified problems. Goals may be stated for the project and/or the student.

4 **STATE OBJECTIVES** in terms of measurable project and student outcomes/behaviors.

5 **SELECT STRATEGIES** to accomplish project and student objectives.

6 **IMPLEMENT REAP** in schools.

7 **EVALUATE REAP** based upon specified project and student objectives.

8 **MAKE RECOMMENDATIONS** for project improvement, project continuation, and/or expansion.

APPENDIX-B - Belize and U.S. Primary Grade Equivalents, With Major Belizean Primary School Divisions

	Belize	U.S.
Infant School Division	Infant I	First Grade
	Infant II	Second Grade
	Standard (Std.) I	Third Grade
Middle Primary Division	Standard (Std.) II	Fourth Grade
	Standard (Std.) III	Fifth Grade
Senior Primary Division	Standard (Std.) IV	Sixth Grade
	Standard (Std.) V	Seventh Grade
	Standard (Std.) VI	Eighth Grade

APPENDIX-C--1984-85 REAP SCHOOL QUESTIONNAIRE
(Field Test Draft--For Discussion Only)

School Name _____ District _____

Location (Village) _____ Date _____/_____/_____

Name of Person Completing Questionnaire _____

Affiliation (one) _____ 1. REAP Staff _____ 2. REAP Dist. Council _____ 3. P.C.V.

_____ 4. Principals _____ 5. CARE

Directions: Please indicate your opinion of how the REAP school meets the criteria by placing a check ( ) in the appropriate box on the evaluation scale. Use only personal observation and/or semester reports as the basis of your evaluation. You must respond to all of the criteria. You may consult others for facts, but you should make your own judgements.

The information from this questionnaire will not be used to evaluate any individual in the REAP Programme.

STATEMENT OF CRITERIA (Please respond to all statements.)	**EVALUATION SCALE** (Check one box for every statement.)			
1. The principal/teacher used the Ministry of Education's REAP Curriculum Guide and the REAP Annual Plan in the planning process to develop the annual, weekly and daily lesson plans for Std. VI, V, and VI.	never	seldom	often	always
2. The principal/teachers used "Let's All REAP Together" as a reference in planning health and nutrition lessons.	never	seldom	often	always
3. The principal/teachers used the "Health and Nutrition Manual for Belize" as a reference in planning health and nutrition lessons.	never	seldom	often	always

STATEMENT OF CRITERIA (Please respond to all statements.)	EVALUATION SCALE (Check one box for every statement.)			
4. The principal and/or teachers used the textbooks (ag. Science, Ecology, Plant Nutrition, etc.) in the reference/resource library in planning related lessons.	never	seldom	often	always
5. Students in Stds. IV, V, and VI successfully completed the following number of REAP/LAPs during the school year.	0-6	7-12	13-18	19 or more
6. Students received activity-based instruction, as described in the REAP Teachers' Inservice Guide.	never	seldom	often	always
7. Students received instruction which integrated the learning of traditional subjects with topics from the REAP curriculum.	never	seldom	often	always
8. The principal and/or teachers evaluated student competence in agriculturally-related skills using the REAP criteria (competency checklist).	never	seldom	often	three or more
9. Students visited another REAP school or had another REAP school visit them.	never	once	twice	three or more
10. The school's principal participated in a REAP summer curriculum workshop(s) lasting approximately 5-8 days. Note: Count all years.	never	once	twice	three or more
11. The school's principal studied REAP as part of the curriculum at the Belize School of Education. Note: Count all years.	never	one year	two years	two plus REAP Internship
12. The principal attended a REAP inservice workshop(s) on agriculture. Note: Count all years.	none	one	two	three or more

STATEMENT OF CRITERIA (Please respond to all statements.)	EVALUATION SCALE (Check one box for every statement.)			
13. The principal attended a REAP inservice workshop(s) on health and nutrition. Note: Count all years.	none	one	two	three or more
14. The principal of the school attended the REAP District Council meetings.	never	seldom	often	always
15. The following number of REAP teachers (not counting the principal) successfully participated in a REAP summer curriculum workshop(s) lasting approximately 5-8 days. Note: Count present teachers/all years.	none	one	two	three or more
16. The following number of REAP teachers (not counting the principal) studied REAP as part of the curriculum at the Belize School of Education. Note: Count present teachers/all years.	none	one	two	three or more
17. The REAP teachers attended an average of the following number of REAP inservice workshops on agriculture. Note: Count present teachers/all years.	none	one	two	three or more
18. The REAP teachers attended an average of the following number of REAP inservice workshops on Health and Nutrition. Note: Count present teachers/all years.	none	one	two	three or more
19. The school has land available for REAP school projects (consider size of plot, quality of land, location and other relevant factors).	inadequate	adequate	good	excellent

STATEMENT OF CRITERIA (Please respond to all statements.)	EVALUATION SCALE (Check one box for every statement.)			
20. The school has a fence around the garden plot (consider quality of construction, effectiveness of the fence and other relevant factors).	inadequate	adequate	good	excellent
21. The school has water available for agricultural use (consider location, amount, working pumps and pipes, and other relevant factors).	inadequate	adequate	good	excellent
22. Students in Stds. IV, V, and VI participated in maintaining the REAP Agricultural facilities at the school (such as: the chicken coops, garden fence, rabbit hutch, bee hives and/or storage areas.	never	during one term	during two terms	during three terms
23. The principal/teachers kept accurate records of the agricultural production in REAP.	never	seldom	often	always
24. Students raised vegetables, staples, cover crops, annual and/or permanent crops during the school year.	never	during one term	during two terms	during three terms
25. Students raised poultry during the school year.	never	during one term	during two terms	during three terms
26. Students produce honey during the school year.	never	during one term	during two terms	during three terms
27. Students raised a plant and/or animal crop(s) other than those already mentioned (such as flowers, rabbits, etc.).	none	one	two	three or more

STATEMENT OF CRITERIA (Please respond to all statements.)	EVALUATION SCALE (Check one box for every statement.)			
28. Students participated in and/or visited an agricultural fair, agricultural demonstration site, and/or agricultural business (commercial farm, ag. supply store, etc.) in a school-sponsored event.	never	once	twice	three or more
29. REAP school leaver(s) conducted REAP-related project(s) at the school, or sponsored by the school.	none	one project	two projects	three or more projects
30. Students cared for the laboratory equipment, instructional materials, tools and/or other equipment used in REAP by returning them, in good condition, to their proper place.	never	seldom	often	always
31. The principal/teachers used a bank account and kept financial records.	never	seldom	often	always
32. The principal and/or REAP teachers cooperated with the REAP District Council and REAP staff, by returning reports promptly.	never	seldom	often	always
33. The principal and/or REAP teachers cooperated with the REAP District Council and REAP staff, by helping coordinate and/or participate in REAP functions.	never	seldom	often	always
34. The following percentage of parents and/or community members are able to describe in general terms, the broad goals, aims, procedures and achievements of the REAP programme in their children's school.	0-25%	26-50%	51-75%	76-100%

STATEMENT OF CRITERIA (Please respond to all statements.)	EVALUATION SCALE (Check one box for every statement.)			
35. The following approximate number of parents and/or community members attended a REAP special event this year.	less than 1/4 of total	1/4 to 1/2 of total	1/2 to 3/4 of total	more than 3/4 of total
36. The following approximate number of parents and/or community members contributed inservice (work) or in kind (gifts) for the improvement of the REAP programme this year.	less than 1/4 of total	1/4 to 1/2 of total	1/2 to 3/4 of total	more than 3/4 of total
37. REAP students, the REAP principal, teachers, and/or community members accomplished something REAP-related worthy of special recognition (such as a newsletter, construction project, special honor, etc.) this year.	none	one	two	three or more
38. As a result of REAP, the number of families with nontraditional home gardens has increased by rough estimate:	none	few	moderate increase	large increase
39. As a result of REAP, the number of families starting to raise chickens using nontraditional methods increased by the following rough estimate:	none	few	moderate increase	large increase
40. As a result of REAP, the number of families starting to produce honey has increased by the following rough estiamte:	none	few	moderate increase	large increase
41. As a result of REAP, the number of families adopting more nutritious diets has increased by the following rough estimate:	none	few	moderate increase	large increase
42. As a result of REAP, the principal and/or teacher(s) have participated in leadership roles in the community:	never	seldom	often	always

STATEMENT OF CRITERIA (Please respond to all statements.)	EVALUATION SCALE (Check one box for every statement.)			
43. As a result of REAP, the community attitude towards agriculturally-related work as a worthwhile career for their children has changed for the better.	no change	little positive change	moderate positive change	large positive change

APPENDIX-D - REAP LEARNING ACTIVITY PACK (REAP/LAP)

Relevant Education for Agriculture and Production

LAP NO. 1.1.1

I TITLE OF ACTIVTY

Hole in the Ground

II APPROPRIATE GRADE LEVEL(S)

Stds. IV, V, VI

III AREA OF STUDY

Soil

IV BASIC SUBJECT(S) INTEGRATED INTO ACTIVITY

A. Mathematics

Average -- Finding average depth of hole.

Linear Measurement -- measuring depth and diameter of each hole with yard/meter stick

-- Finding volume of the hole

-- Finding circumference of hole

B. Science

-- Related that the earth is made of layers (IV)

-- Types of soil

-- How soil is made

-- Erosion of top soil

C. Social Studies

-- Village occupations which are influenced by vegetation, which are influenced by soil profile, which are influenced by soil type. (IV)

-- Migrations to new lands because of soil conditions.

D. Language Arts

-- Sentence construction

-- Paragraph writing

-- Composition writing

-- Vocabulary

-- Comprehension

E. Other Subjects

Arts -- drawing -- draw and label soil profile.

V MAJOR CONCEPT(S) AND/OR SKILL(S)

To identify layers of soil

VI PERFORMANCE OBJECTIVE(S)

The student will draw and label a soil profile which resembles an average soil profile of the local environment indicating, in linear/metric, the depth of topsoil and including general characteristics of the topsoil and sub-soil.

VII EQUIPMENT AND/OR MATERIALS

A. Magnifying glass and microscope.

B. Post hole diggers, or entrenching tool or spade.

C. 2 bags or containers for each group.

D. 2 labels for each group.

E. 1 notebook and 1 pencil for each student.

F. 1 ruler or measuring tape for each group.

G. Resource materials and pictures or diagrams of general soil profile.

VIII READING REFERENCE(S)

Agriculture Science Book I, Persad, Ralph, Nelson's, 1977.

IX PROCEDURE(S) AND RELATED ACTIVITY(IES)

A. Have students copy into their notebooks the following checklist which you have written on the chalkboard.

Date:
Group name:
Hole number:
Location of hole:
Diameter of hole:
Depth of hole:
Depth of topsoil:
Animals and/or objects found in soil:
Description of topsoil:

Description of sub-soil:

B. Divide the class into groups containing four students and have each group select a name such as, type of flower, vegetable or animal. Then explain the activity to the students and go over the form, item by item, so the student will know how to record observations. Each group will be digging holes in different locations around the school compound (middle of a field, near a creek, on a hillside, in the garden). Each task group will choose the location and dig a hole approximately 2 1/2 feet deep and 12-inches in diameter. Have the students collect soil samples, one from near the surface and another from the bottom. The children should then observe the soil profile and try to locate the division between topsoil and subsoil by identifying a color change. The darker soil is topsoil. Using a measuring tape the children will measure the approximate depth of the topsoil. The students will then record such observations as, animals or objects found in the soil and write brief descriptions of the topsoil and subsoil including color, texture, relative moisture, etc. After 30-35 minutes the students should return to the classroom with completed checklists.

C. Each group will then make a presentation of their findings. Select a student to record each group's measurement of topsoil and find the average depth. Have the students make labels containing the location's name, location of hole and the location of the 2 soil samples. Arrange all the samples on a table in the learning centre and place the appropriate label beside each. The students will then compare the samples and verbally note similarities and differences.

D. After finding the average depth of the topsoil, calculate in linear/metric the amount of topsoil in a given area of land.

E. Using the information of the different groups on location of the holes and depth of topsoil, have the student state verbally or in writing the relationship between the kind of vegetation and the depth of the topsoil.

F. Related Activity(ies)

1. Sedimentation

a. Collect soil samples (i.e., clay, loam, etc.)

b. Place in a jar and fill half way with water.

c. Cover jar and shake vigorously.

d. Place jar on a level area to settle.

e. Note the different layers that are formed.

X EVALUATION

Each student will draw and label an average soil profile indicating in the drawing and labelling any of the class's general observations or descriptions of the topsoil and subsoil. The drawing should also have an indication in linear/metric of the depth of the soil profile.

REFERENCE NOTES

CARE/Belize. Multi-Year Project, 1980-1982. Information quoted from Fact Sheets on the Commonwealth, British Information Service, London, England, 1976.

Government of Belize. Belize In Figures, Information and Statistics Office of the Central Planning Unit, Belmopan, Belize, 1984.

Evensen, Iverre. An Inventory of Nutrition Education Activities in Belize, quoted from the 1980 Census of Belize.

Government of Belize and CARE. Rural Education and Agriculture Programme, July 1975 - June 1976. CARE/Belize, Belize City, Belize, 1979.

Massey, R. M. The Rural Education and Agriculture Program, A Summative Evaluation. A report prepared for CARE/Belize, Belize City, Belize, 1979.

Guilliam, Susan. A Report on REAP School Leavers. A report prepared for CARE/Belize and the REAP National Advisory Committee, Belize City, Belize, 1983.

Kerlinger, Fred N. Foundations of Behavioral Research, Second Edition. Holt, Rinehart and Winston, Inc., 1973.

Fagerlind, I. and Saha, Lawrence J. Education and National Development: A Comparative Perspective. Pergamon Press, 1983.